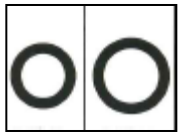
New Brunswick
Fermentor
BioFlo 110 x 3 Units
@ BRDG

New Brunswick
Fermentor
BioFlo 115 x 2 Units
@ BRDG

Crossflow Satorius-Stedim
@ BRDG

Bioprocessing Systems

(Detect Instrument Picture to Jump to that section of SOP)



Tubing Info

ThermoFex Chiller-
for Bio Vessels

Link to SERVICE/REPAIR INFO

Karl Fischer titration

Gas Tanks& Supplier

Prepared by: Bob Morrison
STLCC- Instrumentation Specialist
Original Oct 08, Latest revision Feb 2013

Bioprocessing: BioFlow115, New Brunswick

Note: If GFI or power circuit blows, check to see if rotor or blades are jammed in vessel.

BioFlo 115, PN M1369-5111 B115BG400336
2/3/12 RGM Received to R119
Registered NBSC website 2/9/12
BioFlo 115, PN M1369-5120 B115BG800337
2/3/12 RGM Received to R119
Registered NBSC website 2/9/12
With 1.3L and 14.0L Vessels

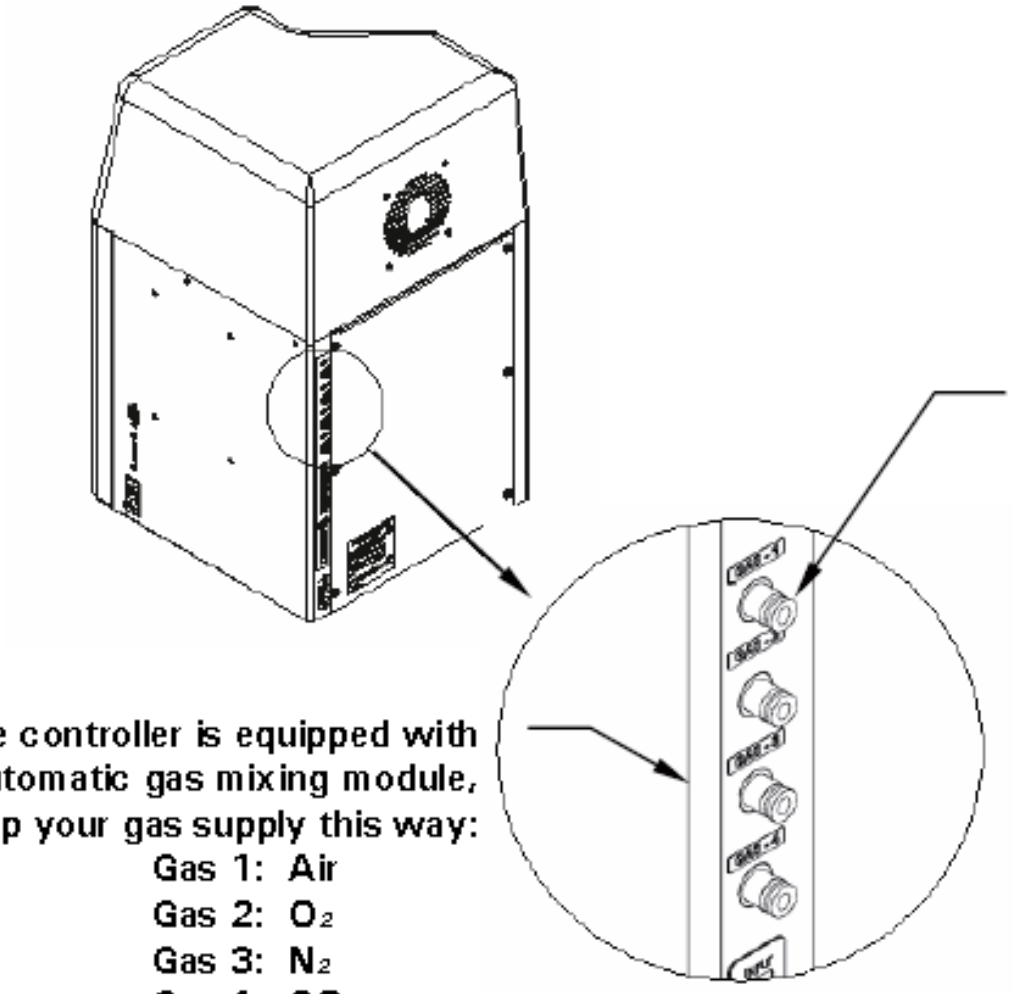
Hot Link to New Brunswick BioFlo 115 Operations Manual … pdf

Hot Link to New Brunswick BioFlo115 Brochure … pdf

Hot Link to New Brunswick BioFlo115 Brochure, Parts, and Desc…. pdf

Grow virtually any cell type: aerobic and anaerobic microbes, yeast, insect, plant and mammalian cells.
Water-jacketed and heat-blanketed autoclavable glass vessels are offered in four sizes, 1.3, 3.0, 7.5 and 14.0 Liters (total volume).
All 115 systems are pre-programmed with both fermentation and cell culture operating modes for total flexibility. Switching between modes automatically adjusts gas flow and speed ranges.
A wide variety of options and accessories provide the versatility for customization to your exact needs. Choose from eight vessels, three motor drives, specialized impellers, up to four Rotameters with multiple gas flow ranges, a Thermal Mass Flow Controller (TMFC), and more.

Bioprocessing: BioFlow 115 Gas Connections



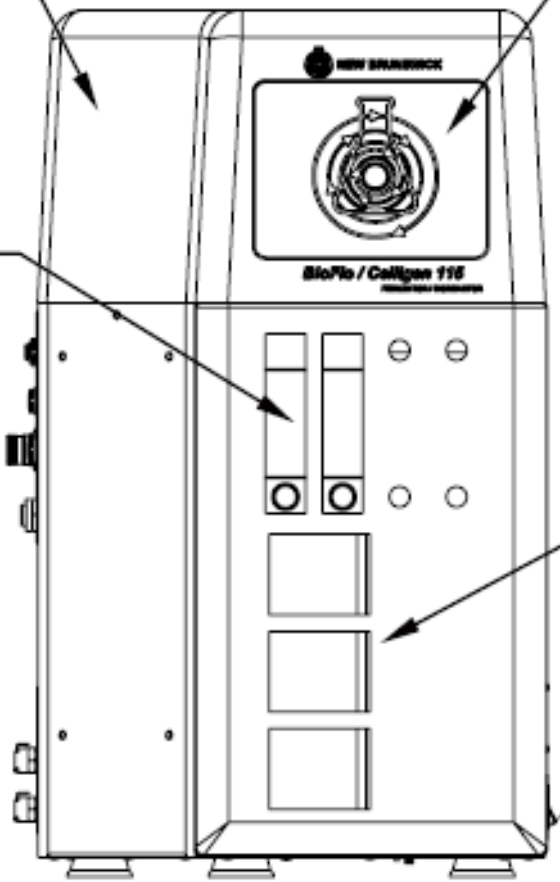
Insert the tubing into the connection simply by pushing it in. Check to be sure the connection is secure by pulling gently on the tubing.

If the controller is equipped with an automatic gas mixing module, set up your gas supply this way:

Gas 1: Air
Gas 2: O_2
Gas 3: N_2
Gas 4: CO_2

Bioprocessing: BioFlo115, Cabinet Controls, Touchscreen

Figure 18: Touchscreen



CONTROL CABINET

TOUCHSCREEN DISPLAY:
Only the control station is equipped with a touchscreen; utility stations do not have one.

ROTAMETERS:
You may have from 0 to 4 rotameters.
The quantity of, and flow rates for, the rotameters will be determined by your system specification.

PUMPS

ON/OFF POWER SWITCH

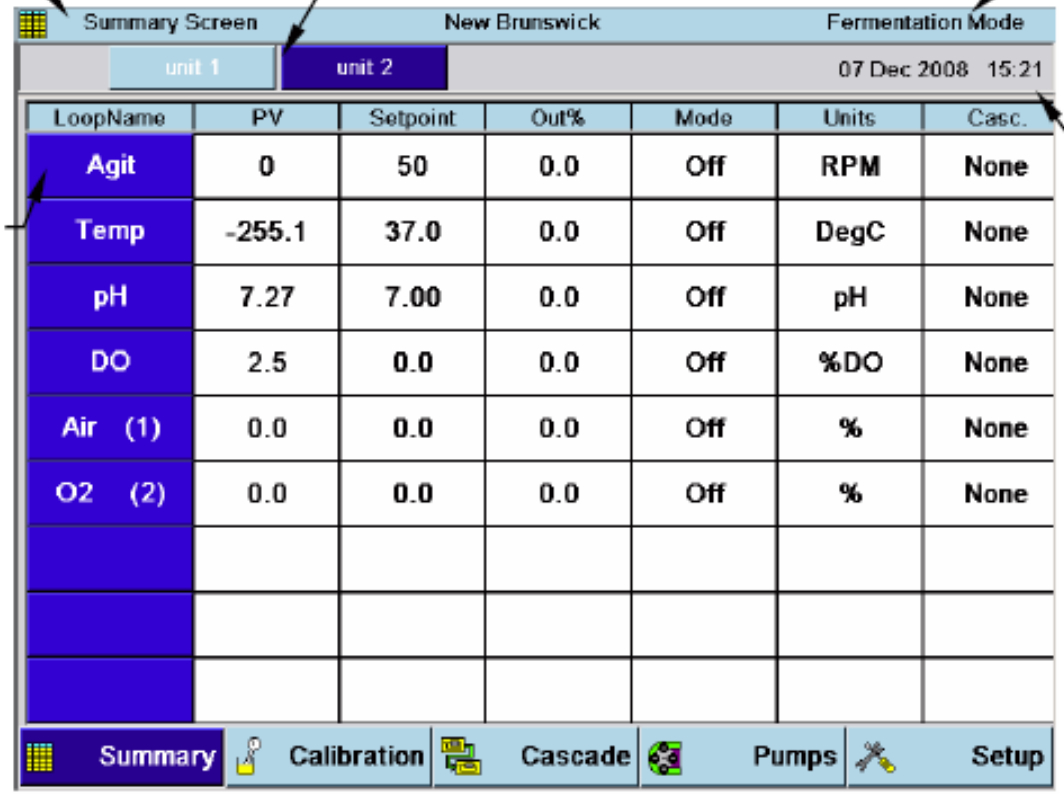
Bioprocessing: BioFlo115, Screen Summary, ex

Figure 19a: Sample SUMMARY Screen (Fermentation with Auto Gas Mix)

SCREEN NAME and ICON

UNIT TABS

OPERATING MODE


Summary Screen
New Brunswick
Fermentation Mode
unit 1
unit 2
07 Dec 2008 15:21
LoopName | PV | Setpoint | Out% | Mode | Units | Casc.
Agit | 0 | 50 | 0.0 | Off | RPM | None
Temp | -255.1 | 37.0 | 0.0 | Off | DegC | None
pH | 7.27 | 7.00 | 0.0 | Off | pH | None
DO | 2.5 | 0.0 | 0.0 | Off | %DO | None
Air (1) | 0.0 | 0.0 | 0.0 | Off | % | None
O2 (2) | 0.0 | 0.0 | 0.0 | Off | % | None
Summary
Calibration
Cascade
Pumps
Setup

Current DATE & TIME

Your BioFlo/CelliGen 115 comes with pre-assigned loop names. The available loops will change depending on your system's configuration. This one is equipped with automatic Gas Mix.

SCREEN ACCESS ⇨ buttons

NOTE:
The dark blue button usually represents the screen being displayed.

Bioprocessing: BioFlo115, Ex: Cell culture without Thermal mass flow control

Figure 19c: Sample SUMMARY Screen (Cell Culture without TMFC)

SCREEN NAME and ICON

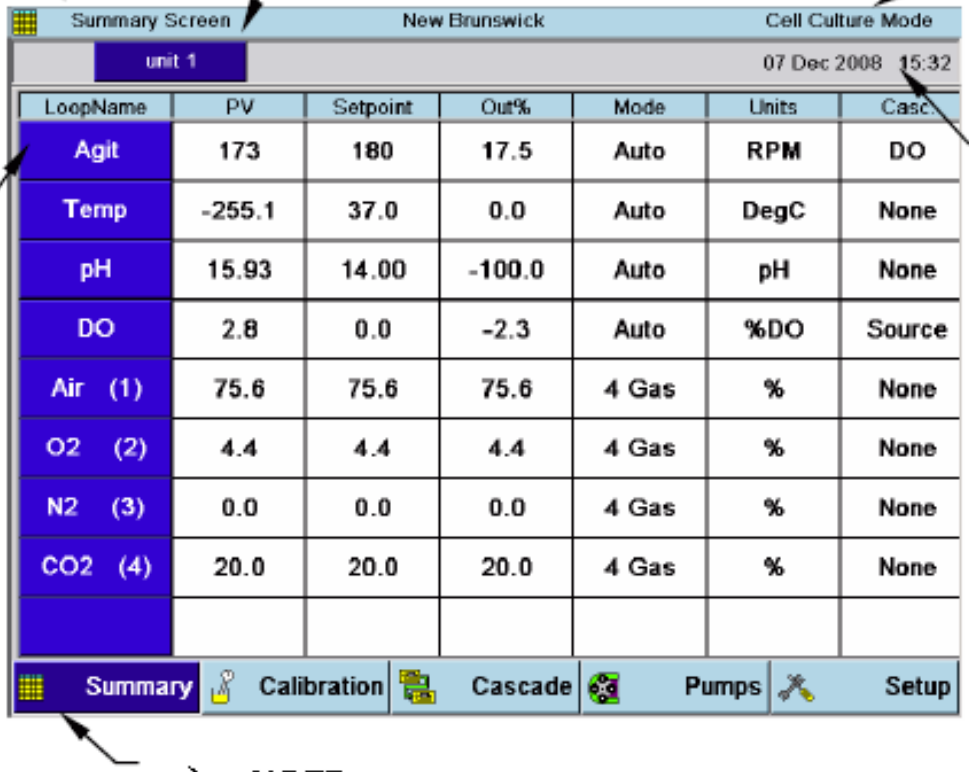
UNIT TAB

OPERATING MODE

Current DATE & TIME

Your BioFlo/CelliGen 115 comes with pre-assigned loop names. The available loops will change depending on your system's configuration. This one is equipped with Gas Mix.

SCREEN ACCESS ⇨ buttons


Summary Screen
New Brunswick
Cell Culture Mode
unit 1
07 Dec 2008 15:32
LoopName | PV | Setpoint | Out% | Mode | Units | Casc
Agit | 173 | 180 | 17.5 | Auto | RPM | DO
Temp | -255.1 | 37.0 | 0.0 | Auto | DegC | None
pH | 15.93 | 14.00 | -100.0 | Auto | pH | None
DO | 2.8 | 0.0 | -2.3 | Auto | %DO | Source
Air (1) | 75.6 | 75.6 | 75.6 | 4 Gas | % | None
O2 (2) | 4.4 | 4.4 | 4.4 | 4 Gas | % | None
N2 (3) | 0.0 | 0.0 | 0.0 | 4 Gas | % | None
CO2 (4) | 20.0 | 20.0 | 20.0 | 4 Gas | % | None
Summary
Calibration
Cascade
Pumps
Setup

NOTE:
The dark blue button usually represents the screen being displayed.

Bioprocessing: BioFlo 115, Notes on Calibrating pH Probe (Ian R. 8/1/12)

- Note: pH probe should always be stored wet, never allow to dry. Do not store in DI water. Recommend 7.0 buffer.

- Go to BioFlo Calibration screen from bottom of main menu

- Rinse probe with DI, put in 7.0 solution, wait for Raw Data display to settle down, can be 10min or more. When it does, push “Set Zero” to lock in value. Note screen will go back to blank after this is set

- Rinse probe with DI, put in 4.0 solution, wait again for Raw Data value to settle, then hit “Set Span” button to lock in value.

- Return pH probe to storage solution or immediately Autoclave for use.
  - Experience has not indicated a recalibration is required after Autoclave

Bioprocessing: BioFlo 115, Notes on DO Probe (per Ian R. 8/1/12)

- In past experience has not calibrated DO probe

- Manual says DO probe must be connected to the controller at least 6 hours before use

Bioprocessing: BioFlo 115, Notes on Air Feed (per Ian R. 8/11/12)

- If Lab air (87 psi) is available/nearby, it must be routed through a regulator to drop pressure to the 10-12 psi range before connecting to a Bioflo controller and/or the vessel

- A peristaltic pump with tubing is generally recommended vs. lab air and can be connected directly to the vessel via any available headplate port. Always install a filter on the inlet side of the tubing to avoid contamination.

Bioprocessing: BioFlo 115, Notes on Sampling (per Ian R. 8/16/12)

- Sanitize hand/gloves, remove foil on the end of the sampling tube, sanitize luerlock port
- Using sterile syringe, extract nominal amount of media via luerlock port on sampling tube, discard this media as it would be in the extraction pipeline and possibly not all from vessel volume.
- Using a fresh sterile syringe, extract desired amount of media
- Test in Spectrophotometer for optical density

Bioprocessing: BioFlo115, Accessories, Parts 1/2

Catalog No.	Description	Price
pH Probe Kits (Probe, Cable, Adapter)		
M1369-9970	For 1.3 L Vessels	$ 794
M1369-9977	For 3.0 L Vessels	800
M1369-9982	For 7.5 L Vessels	824
M1369-9985	For 14.0 L Vessels	934
Replacement pH and DO Probe Cable/Adapter		
P0720-2276	pH cable (all vessels)	407
P0720-2336	DO cable (all vessels)	544
M1273-5040	pH/DO probe adapter (12mm compression)	165
DO Probe Kits (Probe, Cable, Adapter)		
M1369-9974	For 1.3 L Vessels	2,770
M1369-9979	For 3.0 L Vessels	2,825
M1369-9986	For 7.5 L Vessels	2,945
M1369-9988	For 14.0 L Vessels	3,070
Replacement Foam/Level Kits (Foam probe, Level probe, Cable, Adapters)		
M1369-9947	For 1.3 L Vessels	328
M1369-9951	For 3.0 L Vessels	328
M1369-9960	For 7. 5L & 14.0 L Vessels	384
Replacement Foam/Level Cable/Adapter		
M1361-8014	Foam/Level cable (all vessels)	302.10
M1273-5042	Foam/Level probe adapter (12mm compression)	175

Catalog No.	Description	Price
Replacement Motors		
M1369-3120	Direct Drive, For 1.3 & 3.0 L Fermentors	$ 1,015
M1369-3125	Direct Drive, For 7.5 &14.0 L Fermentors	1,070
M1369-3135	Direct Drive, For All vessel sizes, Cell Culture	1,015
M1369-3130	Magnetic Drive, For All vessel sizes	1,120
Replacement Heater Blankets		
M1369-8021	For 1.3 L Vessels	355
M1369-8022	For 3.0 L Vessels	355
M1369-8020	For 7.5 L Vessels	381
M1369-8023	For 14.0 L Vessels	381
Replacement Water Jacket Heaters		
M1369-3107	For 1.3 & 3.0 L Vessels	1,270
M1369-3108	For 7.5 & 14.0 L Vessels	1,295
Replacement Glass Vessels		
M1273-9907	1.3 L Heat Blanket Vessel	261
M1273-9909	3.0 L Heat Blanket Vessel	306
M1273-9916	7.5 L Heat Blanket Vessel	645
M1273-9918	14.0 L Heat Blanket Vessel	829
M1273-9908	1.3 L Water Jacket Vessel	978
M1273-9915	3.0 L Water Jacket Vessel	1,040
M1273-9917	7.5 L Water Jacket Vessel	1,315
M1273-9919	14.0 L Water Jacket Vessel	2,150

Bioprocessing: BioFlo115, Accessories, Parts 2/2

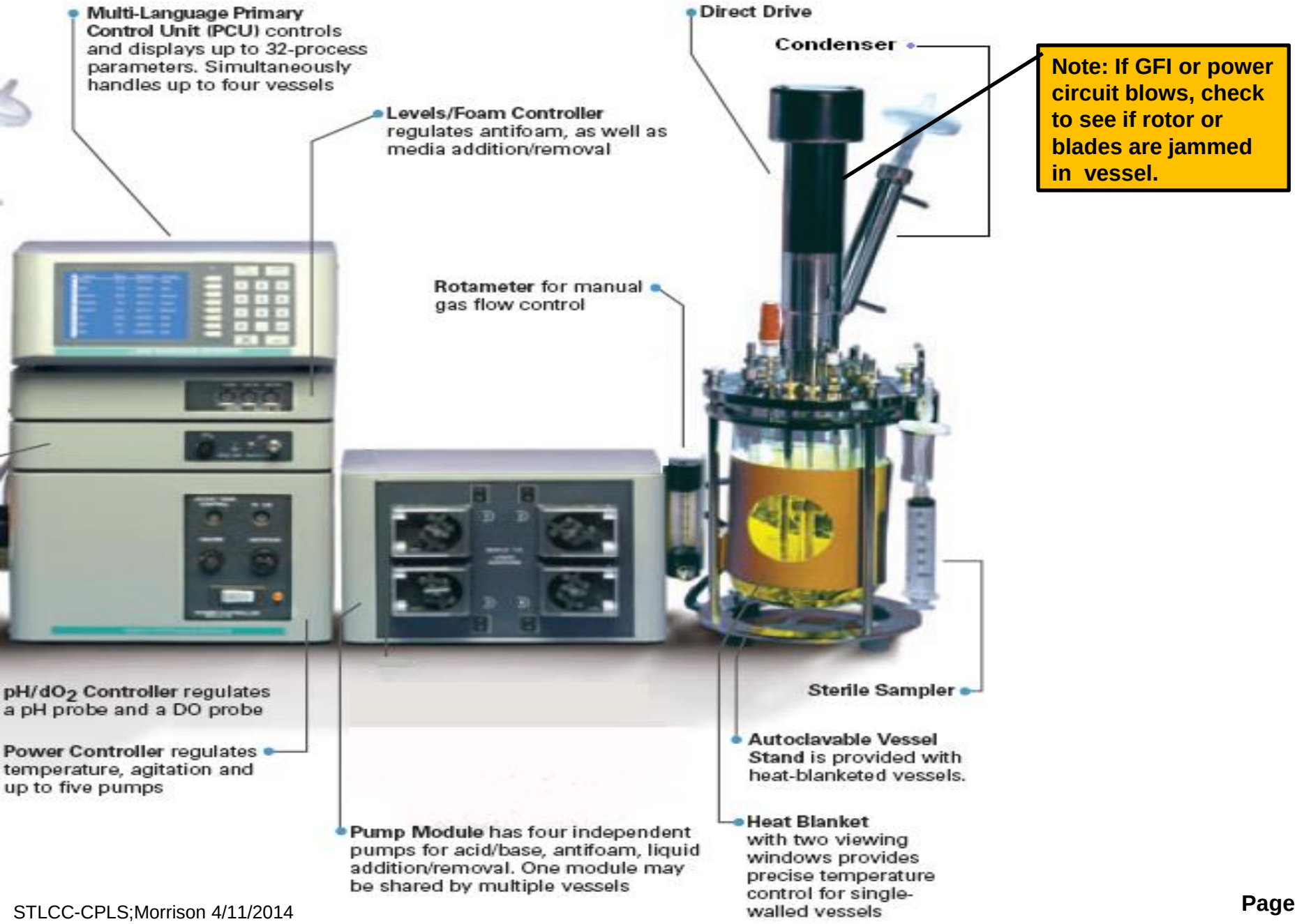
Catalog No.	Description	Price
Replacement Exhaust Condensers		
M1273-9945	For 1.3, 3.0 and 7.5 L Vessels	$ 755
M1273-9957	For 14.0 L Vessels	890
Headplate Adapters & Plugs		
M1273-9961	Tri-port Adapter	247
M1273-5040	pH/DO Probe Adapter (12 mm compression)	165
M1273-5042	Foam/Level Probe Adapter (12mm compression)	175
M1273-3031	Septum Kit	238
M1273-5054	6mm Adapter kit, (6mm port for 6mm tube)	180
M1273-9575	6mm Single Addition Tube for 6mm adapter	103
M1273-5055	Adapter Kit, 12mm port to 6mm tube	173
M1273-5058	Adapter Kit, 12mm port to 12mm tube	149
M1273-9405	6.35 mm Port Plug	60
M1273-9406	12mm Port Plug	61
M1273-9407	19mm Port Plug	95
Replacement and Spare Parts		
M1273-9900	Headplate Port Washers/O-Rings	78
M1273-9991	Spare Parts Kit, 1.3 & 3.0 L HB Vessel	457
M1273-9992	Spare Parts Kit, 7.5 & 14.0 L HB Vessel	568
M1273-9998	Spare Parts Kit, 1.3 & 3.0 L WJ Vessel	492
M1273-9999	Spare Parts Kit, 7.5 & 14.0 L WJ Vessel	608
Impellers		
M1273-9291	Rushton Impeller, 1.3 & 3.0 L	300
M1273-9292	Rushton Impeller, 7.5 L	361
M1273-9293	Rushton Impeller, 14.0 L	438
M1273-9205	Pitched Blade, 1.3 & 3.0 L, Upflow	386
M1273-9207	Pitched Blade, 7.5 & 14.0 L, Upflow	472
M1273-9290	Pitched Blade, 1.3 & 3.0 L, Downflow	386
M1230-9212	Pitched Blade, 7.5 & 14.0 L, Downflow	477
M1273-9901	Marine Blade, 1.3, 3.0 L	265
M1273-9902	Marine Blade, 7.5 & 14.0 L	331
M1273-3201	Spin Filter Suspension Cells, 1.3 L	2,055
M1273-3202	Spin Filter Suspension Cells, 3.0 L	2,210
M1273-3205	Spin Filter Suspension Cells, 7.5 L	2,340
M1273-3210	Spin Filter Suspension Cells, 14.0 L	2,465
M1273-3211	Spin Filter Microcarriers, 1.3 L	2,055
M1273-3212	Spin Filter Microcarriers, 3.0 L	2,210
M1273-3215	Spin Filter Microcarriers, 7.5 L	2,340
M1273-3220	Spin Filter Microcarriers, 14.0 L	2,465

Catalog No.	Description	Price
Microspargers		
M1273-5007	Sintered/Porous Microsparger, 1.3 L HB Vessel	$ 624
M1273-5003	Sintered/Porous Microsparger, 1.3 L WJ Vessel	624
M1273-5004	Sintered/Porous Microsparger, 3.0 L	543
M1273-5005	Sintered/Porous Microsparger, 7.5 L	543
M1273-5006	Sintered/Porous Microsparger, 14.0 L	543
Sampling Assemblies		
M1273-9946	Sampling Assembly, 1.3 L	574
M1273-9949	Sampling Assembly, 3.0 L	739
M1273-9953	Sampling Assembly, 7.5 L	739
M1273-9956	Sampling Assembly, 14.0 L	739
Rotameter Kits		
M1287-3520	0 - 20 SLPM Rotameter with stand & tubing	291
M1287-3510	0 - 5 SLPM Rotameter with stand & tubing	291
Miscellaneous		
M1273-9266	Autoclave Rack for 7.5 and 14.0 L Vessels	430
M1273-5001	Water Regulator Kit (4 manifolds)	924
M1273-5002	Air Regulator Kit (4 manifolds)	671
M1117-2040	Water Regulator/Filter Kit (for single system)	770
M1230-3030	Air Regulator/Filter Kit (for single system)	500
M1273-9936	Bearing Housing Cap (10 pack)	55
M1273-9989	Addition Bottle Kit (250 mL)	293
M1273-9990	Addition Bottle Kit (500 mL)	293
M1273-9940	Addition Bottle Holder Kit	117
P0660-1050	Silicone Grease for Seals/O-rings	36
P0160-4460	Silicone Tubing Clamp	4
P0240-2680	Polysulfone Quick-Connect (Female) 1/4" (0.635 cm)	6
P0240-2670	Polysulfone Quick-Connect (Male) 1/4" (0.635 cm)	6

Vessel Headplate Ports

Vessel Size (L)	6 mm	12 mm	19 mm	Total Ports
1.3	1	9	0	10
3.0	6	7	0	13
7.5	7	8	1	16
14.0	7	8	1	16

Bioprocessing: Fermentor, New Brunswich BioFlo 110 (@BRDG)


Multi-Language Primary Control Unit (PCU) controls and displays up to 32-process parameters. Simultaneously handles up to four vessels
Levels/Foam Controller regulates antifoam, as well as media addition/removal
Direct Drive
Condenser
Note: If GFI or power circuit blows, check to see if rotor or blades are jammed in vessel.
Rotameter for manual gas flow control
pH/dO2 Controller regulates a pH probe and a DO probe
Power Controller regulates temperature, agitation and up to five pumps
Pump Module has four independent pumps for acid/base, antifoam, liquid addition/removal. One module may be shared by multiple vessels
Sterile Sampler
Autoclavable Vessel Stand is provided with heat-blanketed vessels.
Heat Blanket with two viewing windows provides precise temperature control for single-walled vessels

Bioprocessing: Fermentor, BioFlo110 , Manuals & Information

Hot Link to New Brunswick BioFlo 110 Operations Manual … pdf (3mb)

Hot Link to Overview Pichia processing … pdf

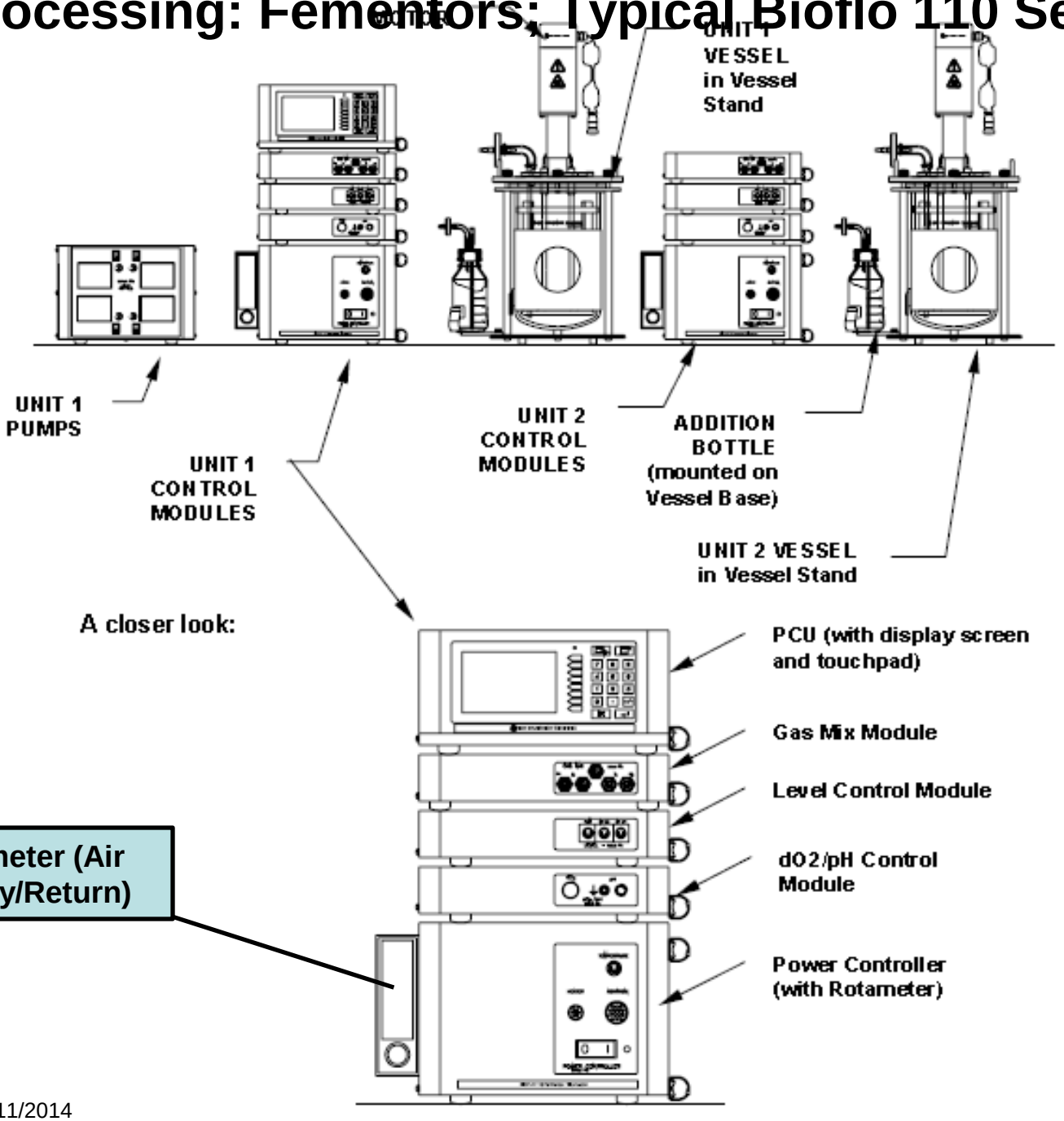
Hot Link to Paper on Pichia Protocol … pdf

Hot Link to Paper on Anaerobic Yeast Ethanol … pdf

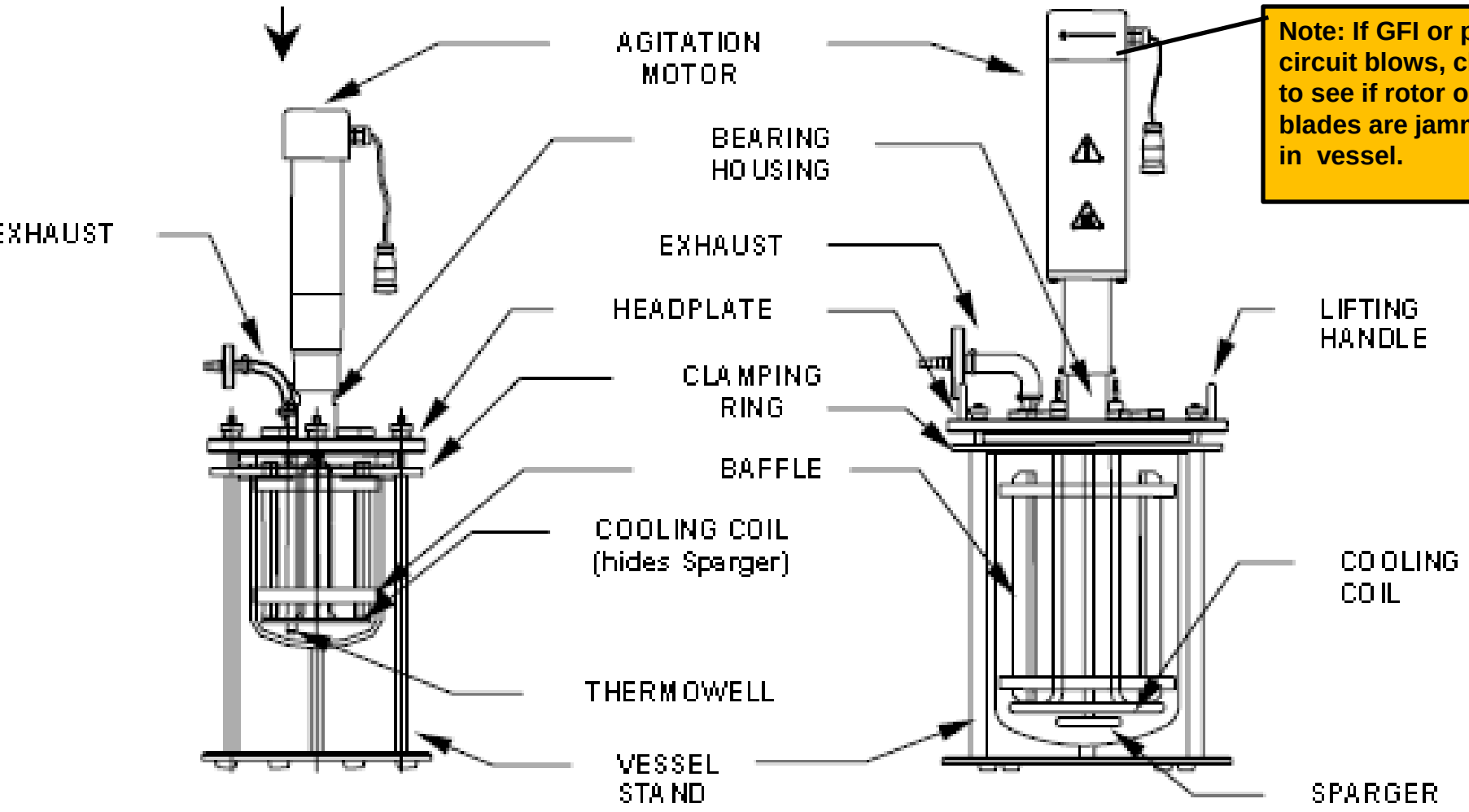
Hot Link to New Brunswick BioFlo115 Brochure … pdf

Hot Link to New Brunswick BioFlo115 Brochure, Parts, and Desc…. pdf

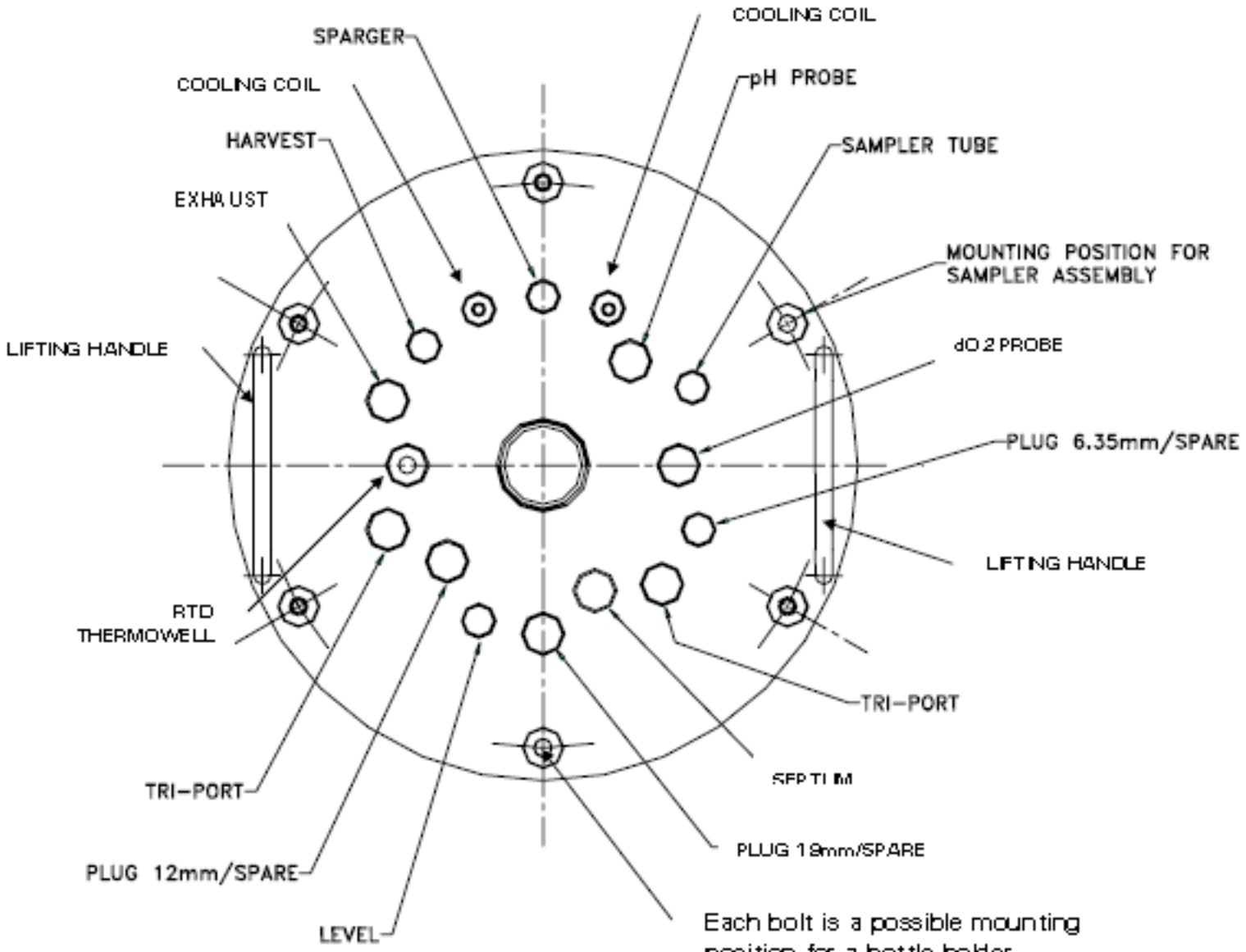
Bioprocessing: Fementors: Typical Bioflo 110 Setup


UNIT 1 VESSEL in Vessel Stand
UNIT 1 PUMPS
UNIT 1 CONTROL MODULES
UNIT 2 CONTROL MODULES
ADDITION BOTTLE (mounted on Vessel Base)
UNIT 2 VESSEL in Vessel Stand
A closer look:
PCU (with display screen and touchpad)
Gas Mix Module
Level Control Module
dO2/pH Control Module
Power Controller (with Rotameter)
Rotameter (Air Supply/Return)

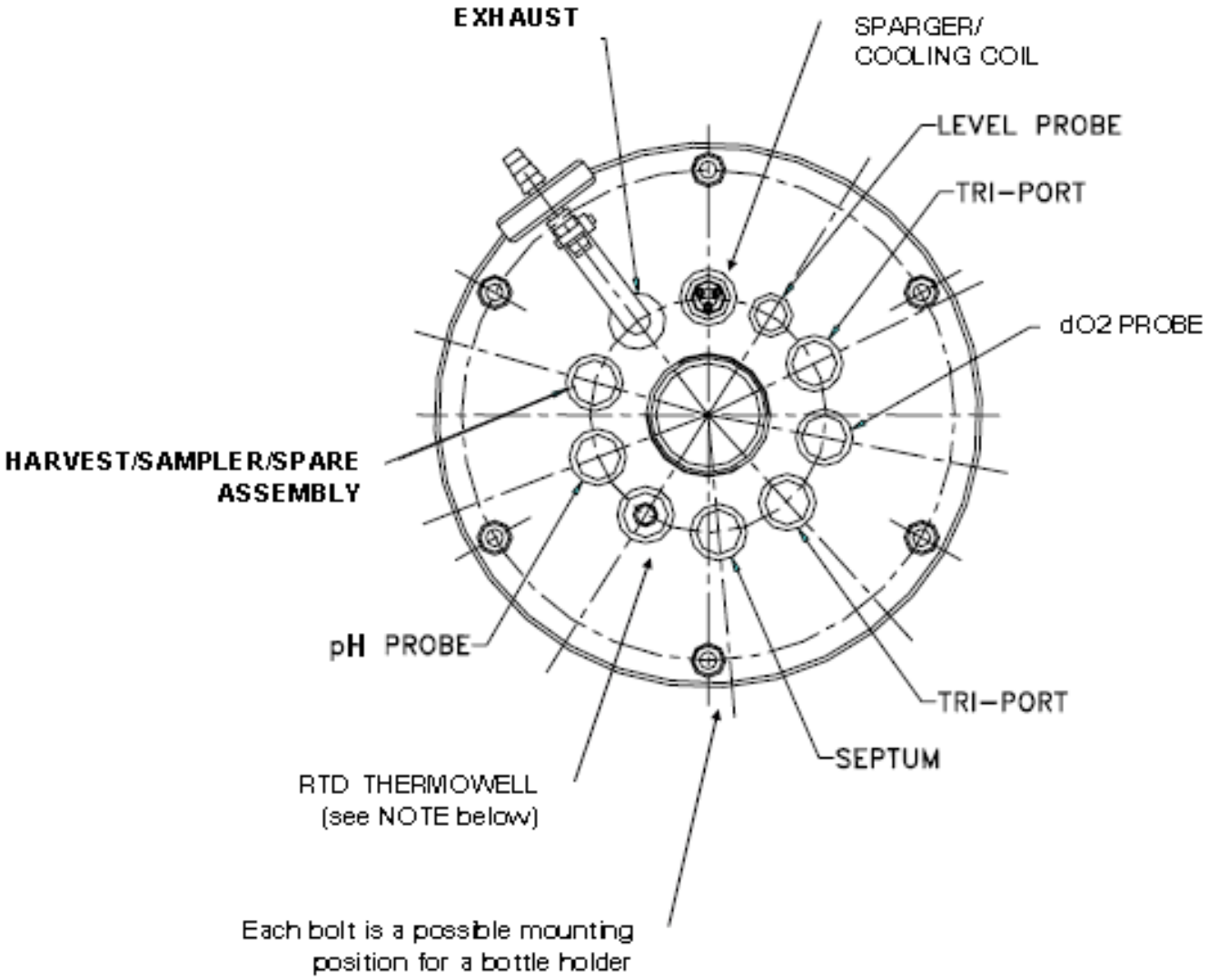
Bioprocessing: Fermentors; Bioflo 110 Vessel Components



Bioprocessing: Fermentor; 7.5 and 14.L Headplate Definition

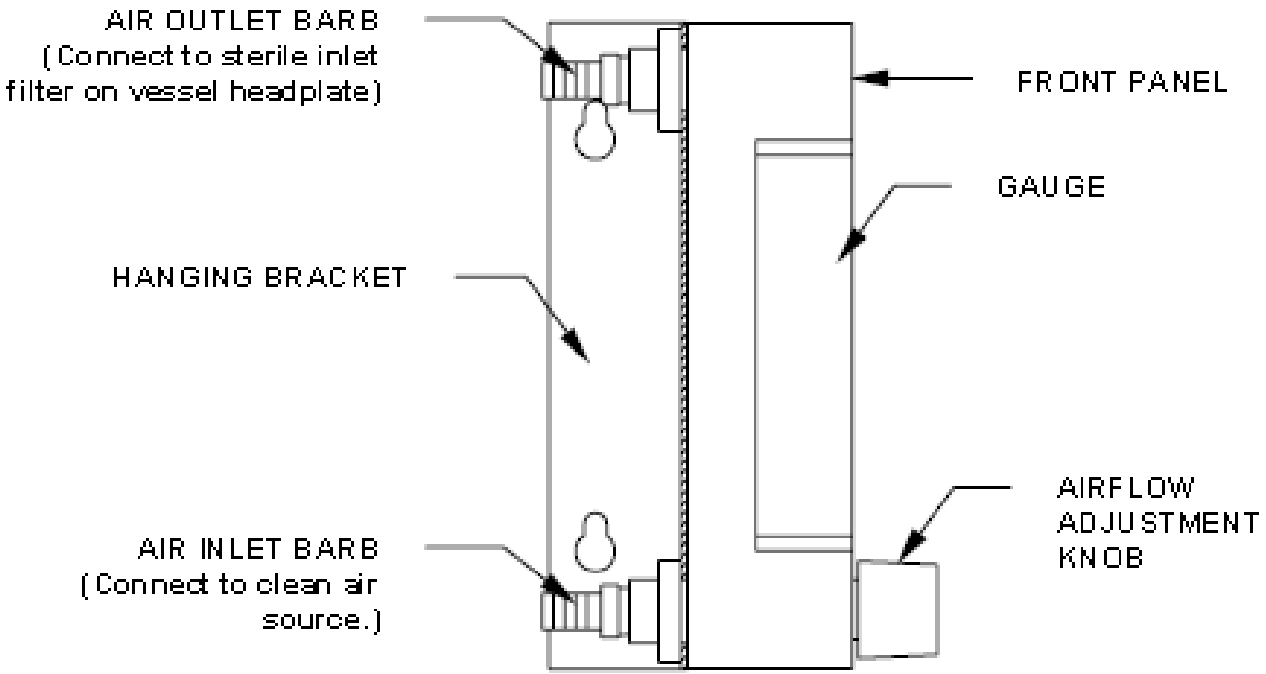


Bioprocessing: 1.3L Headplate configuration



Bioprocessing: Rotameter on Air Supply

Figure 34: Rotameter—Side View



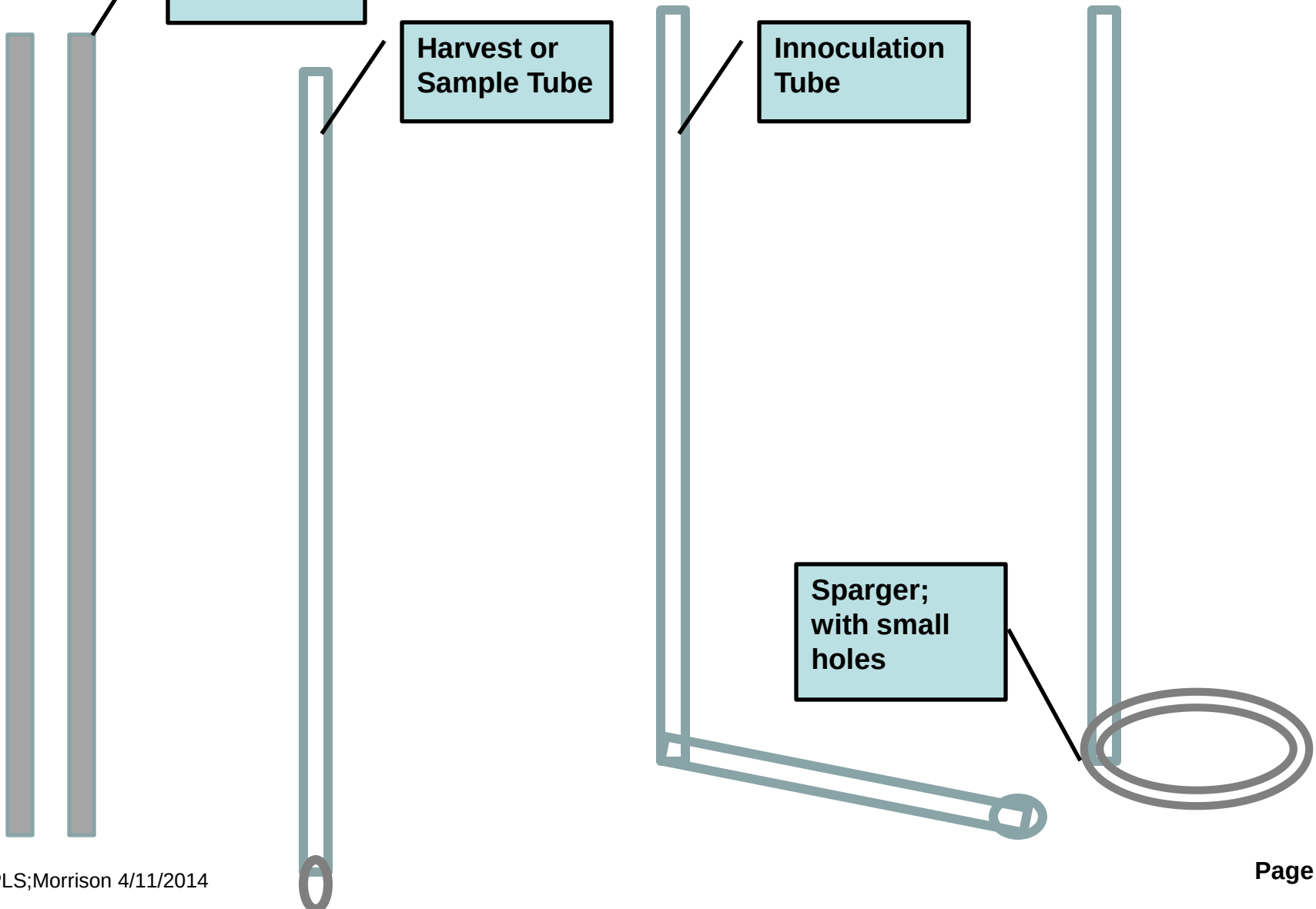
3. Attach another piece of silicone tubing to the top air outlet hose barb (*see Figure 34 above*). Insert the other end of this tubing into the inlet sterile filter on the top of the vessel headplate.
4. Verify that the exhaust port is connected to a filter. If you are using the optional exhaust condenser, the filter should be attached to its outlet.
5. Read the airflow at the top flat edge of the float.

To increase airflow, turn the adjusting knob counterclockwise. To decrease airflow, turn it clockwise.

Max flow rate Fermentation= 11.4 Lpm, Cell Culture 2.5 Lpm

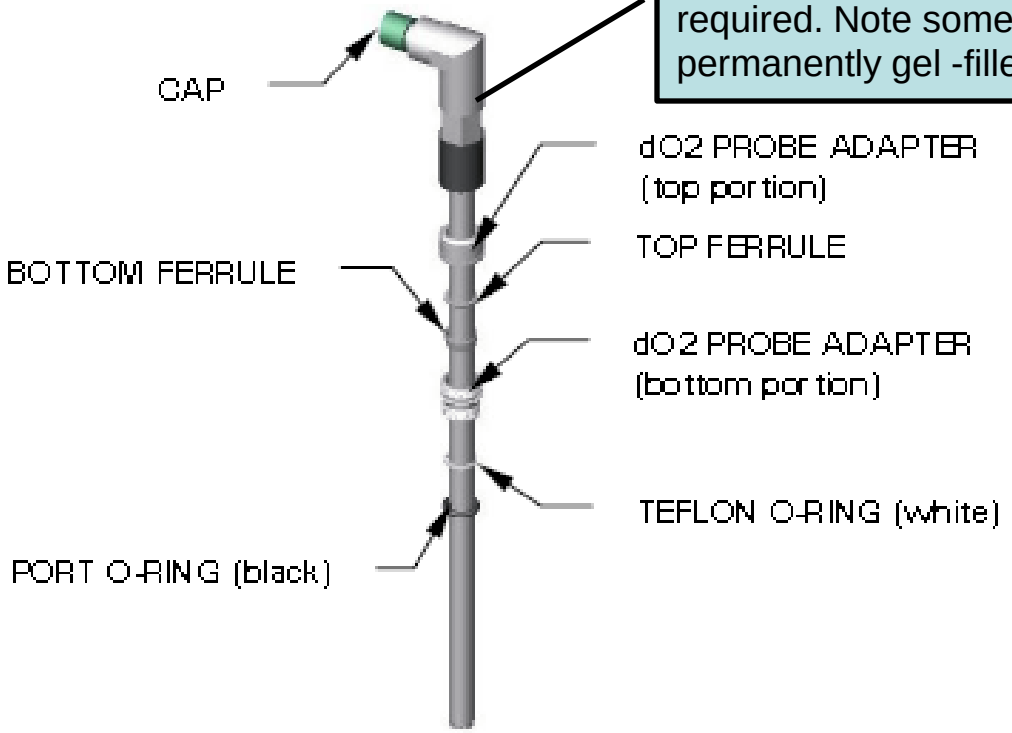
Bioprocessing: Probes and Tubes

Note: Take extreme care not to bend any hollow tubes. If only slightly bent, ferrules and other attachment fittings cannot be moved and the entire tube may need to be replaced.



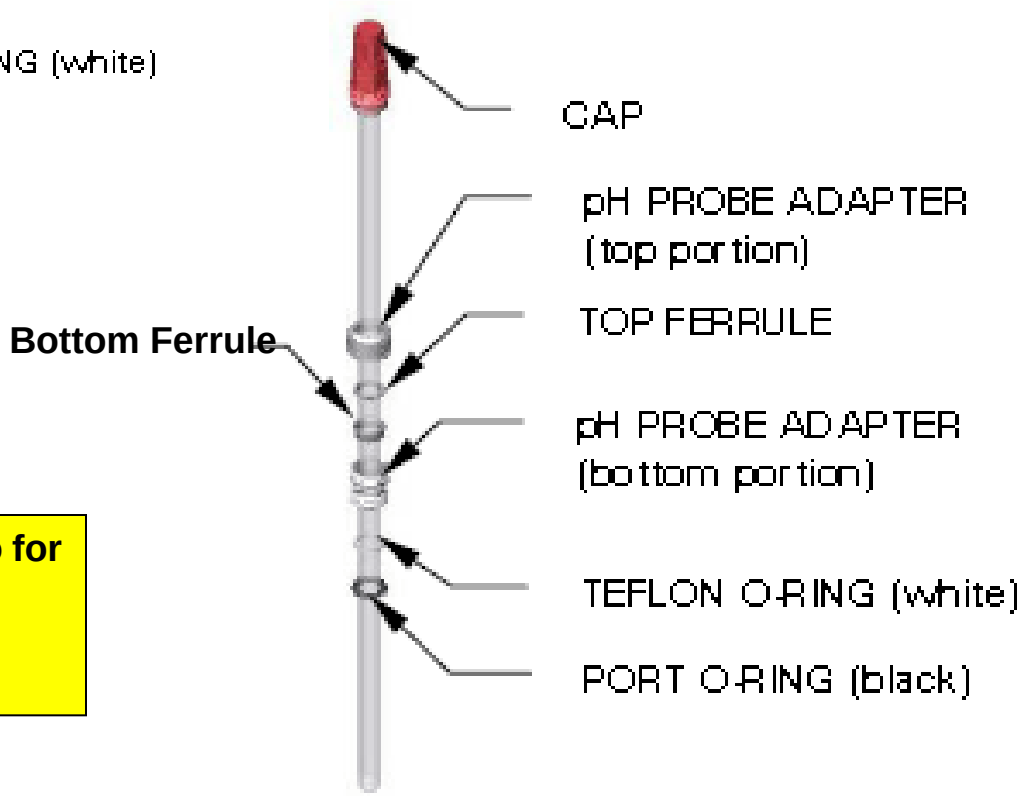
Bioprocessing: dO2 and pH Probe Assembly

Fill with squeeze bottle solution if required. Note some models are permanently gel -filled



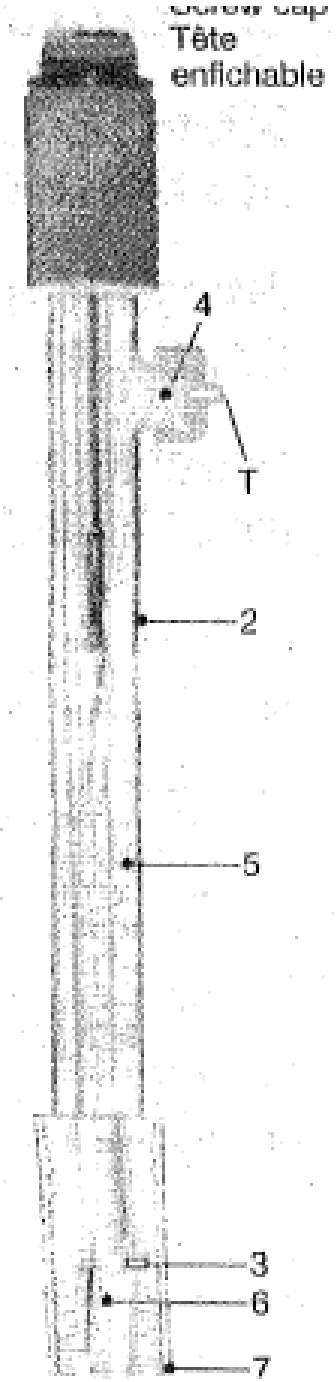
Calibration:
Ph 7, Set Zero, wait until counts stabilize, then enter value, then return key

X to get back to next setting.



Email to Mettler-Toledo for Quote on pH probe:
405-DPAS-SC-K8S/325
mtprous@mt.com

Bioprocessing: pH Probe 1.3L , Mettler, Unpacking



1. When unpacking, check electrode for possible mechanical damage to the membrane (1), the diaphragm (3) or the body (2). Electrodes subject to complaints must be returned to us or to our agent in the original box indicating the invoice number.
2. Take off watering cap (7) and flush electrode with distilled water.
   After rinsing with dist. water, wipe the electrode with a tissue. Do not rub as an increase of the response time might result.
3. Remove rubber cap which covers the electrolyte filling aperture (4) or cut off nipple (T) to ensure pressure equalization with the atmosphere.
4. **Eliminate any air bubbles inside the membrane space (6) of the measuring electrode by smoothly swinging the unit in the vertical plane.**
5. To renew a dried out glass membrane, soak it for several hours in the appropriate storage solution. It is recommended to store glass electrodes in dist. water, combined and reference electrodes in the reference electrolyte solution (as under 8).
6. After a long and dry storage period, the glass membrane can be reactivated with hydrofluoric acid (code no. 51-340 073): the electrode membrane is dipped for 1 min. in this solution followed by rinsing with dist. water and soaking for 12 hours in the storage solution.
7. Electrodes with ground sleeve diaphragm: Slightly lift the ground sleeve so that some reference electrolyte drops out.
8. Check level of electrolyte (5) which should be approx. 10 mm below refilling aperture (4). Refill, if necessary with:
   - 3M KCl+AgCl (order no. 51 340 045) for electrodes with Ag/AgCl wire
   - 3M KCl (order no. 51 340 049) or VISCOLYT (order no. 51 340 235) for high temperature electrodes with ARGENTHAL cartridge.
9. Electrodes with gellified electrolyte without refilling port are treated as per §§ 1, 2, 4, 5, 6 above. For storage we recommend a solution 3 mol/l KCl.
10. Before calibrating or taking measurements, attention should be paid to the instructions of the relative pH instrument manufacturer. Additionally, please refer to the METTLER

./2014

Bioprocessing: DO Probe Kit 1.3L, Adapter Assembly Details

Organization: Edison Manufacturing
Item: M1369-9974 BF115 DO Electrode Kit, Mettler Ingold - 1.3L
Alternate: Primary
UOM: EA Revision: A Engineering Bill: No Date: 2011/08/05 10:14

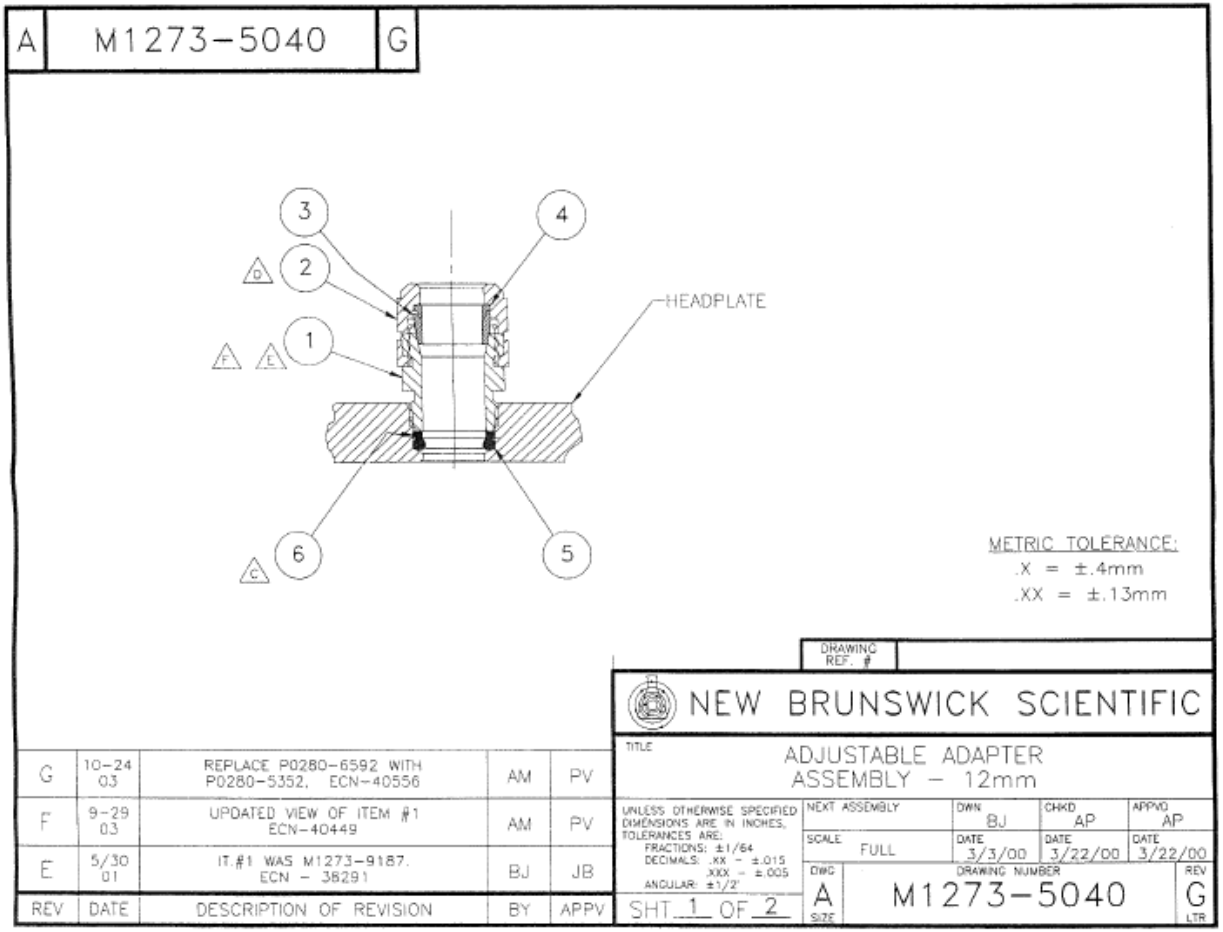
Components

Level	Item Seq	Op Seq	Item	Description	Rev	UOM	Quantity	Effective Date	Effective Time	Disable Date	Disable Time	Extended Qty	ECO
1	1	10	P0720-6580	ELECTRODE,DO,1	C	EA	1.000	15-JAN-09	12:53			1.000	
1	2	10	M1273-5040	Probe Adapter,	G	EA	1.000	15-JAN-09	12:53			1.000	
1	3	10	M1273-9147	PROBE SLEEVE	B	EA	1.000	15-JAN-09	12:53			1.000	
1	4	10	P0720-2336	CABLE, DO, COA	D	EA	1.000	15-JAN-09	12:53			1.000	
1	5	10	P0640-9046	BAG PLYE .004T	A	EA	1.000	15-JAN-09	12:53			1.000	
1	6	10	M1369-9610	LABEL, 1.3L IN	A	EA	1.000	15-JAN-09	12:53			1.000	

***** End of Report *****

Bioprocessing: Headplate, Adapter, Adjustable 12mm

(required for pH, DO, Condenser)


A
M1273-5040
G
3
4
2
1
6
5
HEADPLATE
METRIC TOLERANCE:
.X = ±.4mm
.XX = ±.13mm
DRAWING REF. #
NEW BRUNSWICK SCIENTIFIC
TITLE
ADJUSTABLE ADAPTER ASSEMBLY – 12mm
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS: ±1/64 DECIMALS: .XX – ±.015 .XXX – ±.005 ANGULAR: ±1/2°
NEXT ASSEMBLY
SCALE FULL
DWN BJ DATE 3/3/00
CHKD AP DATE 3/22/00
APPVD AP DATE 3/22/00
DWG A SIZE
DRAWING NUMBER M1273-5040
REV G LTR
SHT 1 OF 2
REV | DATE | DESCRIPTION OF REVISION | BY | APPV
G | 10-24 03 | REPLACE P0280-6592 WITH P0280-5352, ECN-40556 | AM | PV
F | 9-29 03 | UPDATED VIEW OF ITEM #1 ECN-40449 | AM | PV
E | 5/30 01 | IT.#1 WAS M1273-9187. ECN – 38291 | BJ | JB

Organization: Edison Manufacturing
Item: M1273-5040 Probe Adapter, 12 mm compression
Alternate: Primary

UOM: EA Revision: G Engineering Bill: No Date: 2011/08/02 13:34

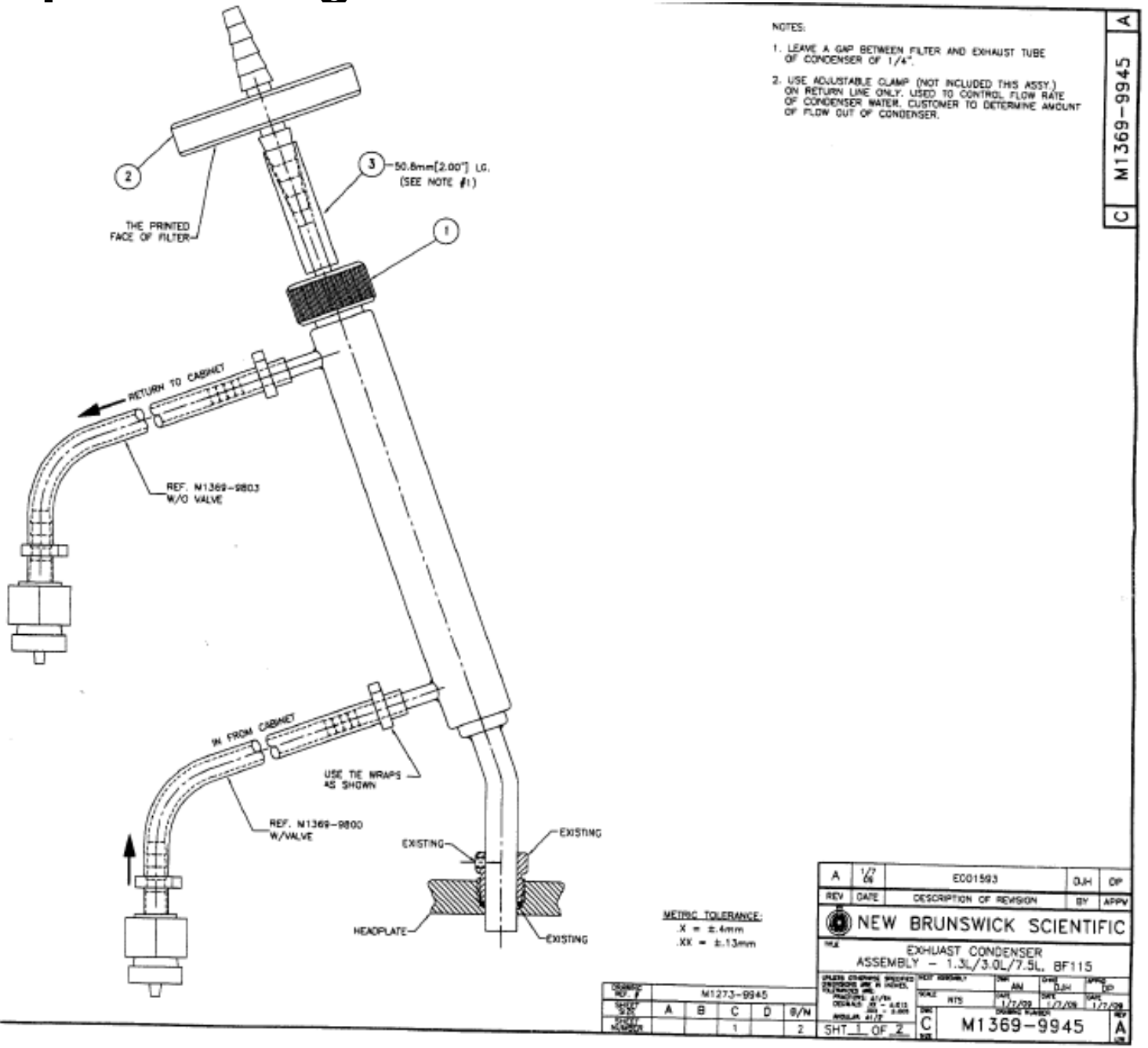
Components

Level	Item Seq	Op Seq	Item	Description	Rev	UOM	Quantity	Effective Date	Effective Time	Disable Date	Disable Time	Extended Qty	ECO
1	1	10	M1273-9400	ADAPTER, COMPRESSION 12mm	D	EA	1.000	12-JAN-07	14:52			1.000	
1	2	10	M1273-9580	KNURLED NUT, MODIFIED	G	EA	1.000	12-JAN-07	14:52			1.000	
1	3	10	P0240-3200	FERRULE, FRONT, TEFLON, 12mm	B	EA	1.000	12-JAN-07	14:52			1.000	
1	4	10	P0240-3201	FERRULE, BACK, TEFLON, 12mm	B	EA	1.000	12-JAN-07	14:52			1.000	
1	5	10	P0280-5352	O-RING 2-013 EPRP	F	EA	1.000	12-JAN-07	14:52			1.000	
1	6	10	P0100-9870	WASHER, .050"THK, .505"ID, TEFLON	A	EA	1.000	12-JAN-07	14:52			1.000	

***** End of Report *****

ST

Bioprocessing: Exhaust Condenser Details


NOTES:
1. LEAVE A GAP BETWEEN FILTER AND EXHAUST TUBE OF CONDENSER OF 1/4".
2. USE ADJUSTABLE CLAMP (NOT INCLUDED THIS ASSY.) ON RETURN LINE ONLY. USED TO CONTROL FLOW RATE OF CONDENSER WATER. CUSTOMER TO DETERMINE AMOUNT OF FLOW OUT OF CONDENSER.
A
C M1369-9945
2
3
50.8mm[2.00"] LG. (SEE NOTE #1)
THE PRINTED FACE OF FILTER
1
RETURN TO CABINET
REF. M1369-9803 W/O VALVE
IN FROM CABINET
USE TIE WRAPS AS SHOWN
REF. M1369-9800 W/VALVE
EXISTING
EXISTING
HEADPLATE
EXISTING
METRIC TOLERANCE:
.X = ±.4mm
.XX = ±.13mm
A 1/7/09 EC01593 DJH DP
REV DATE DESCRIPTION OF REVISION BY APPV
NEW BRUNSWICK SCIENTIFIC
EXHUAST CONDENSER ASSEMBLY - 1.3L/3.0L/7.5L, BF115
M1273-9945
A B C D S/N
1 2
SHT 1 OF 2
C M1369-9945 A

Bioprocessing: Exhaust Condenser, Bill of Materials

Organization: Enfield Manufacturing
Item: M1369-9945 EXHAUST CONDENSER ASSEMBLY, 1.3/3/7.5L, BF115 Engineering Bill: No
Alternate: Primary UOM: EA Revision: A Date: 2012/01/17 08:46

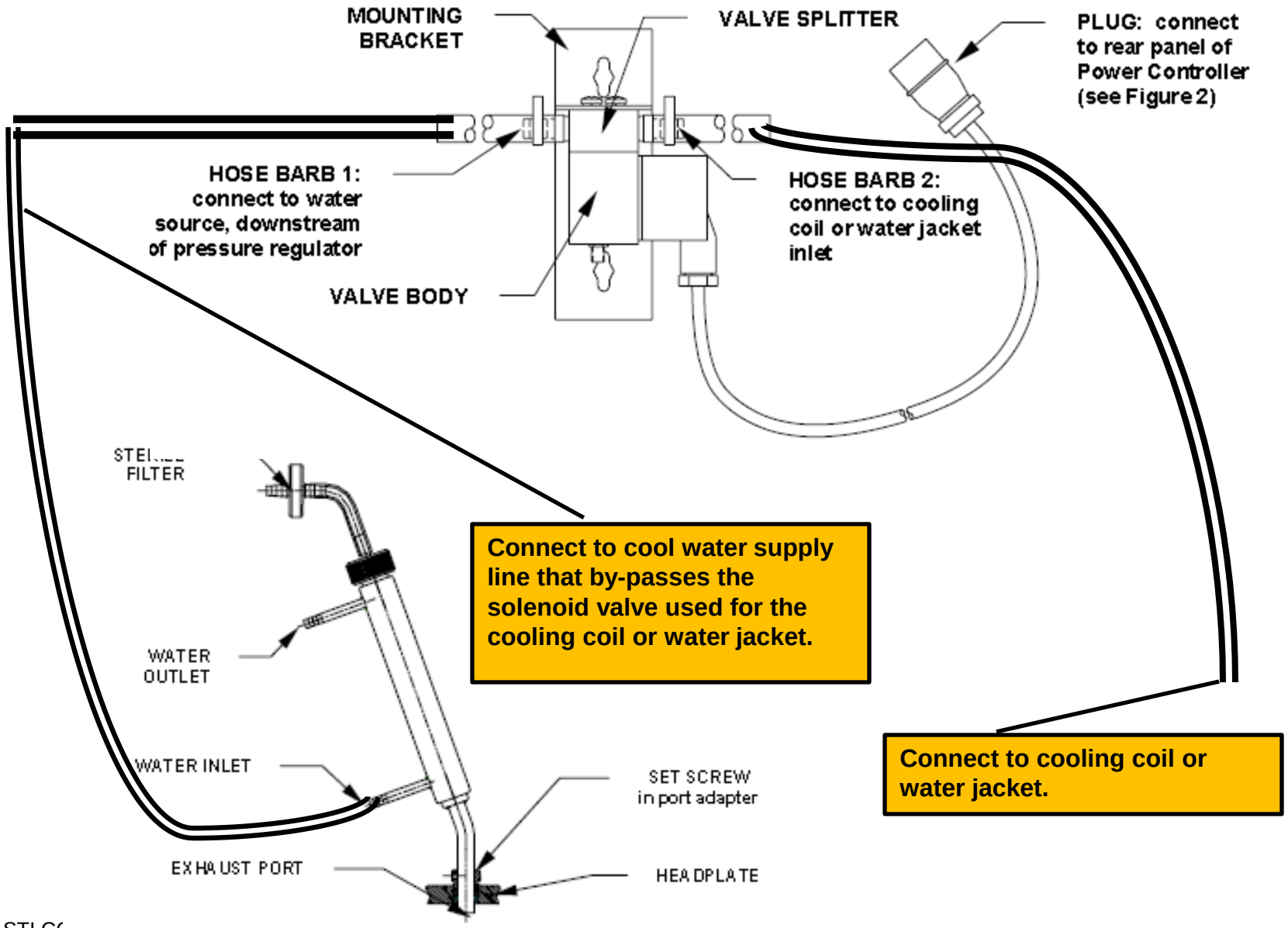
Bill Of Material Comments

Name	Comment Text

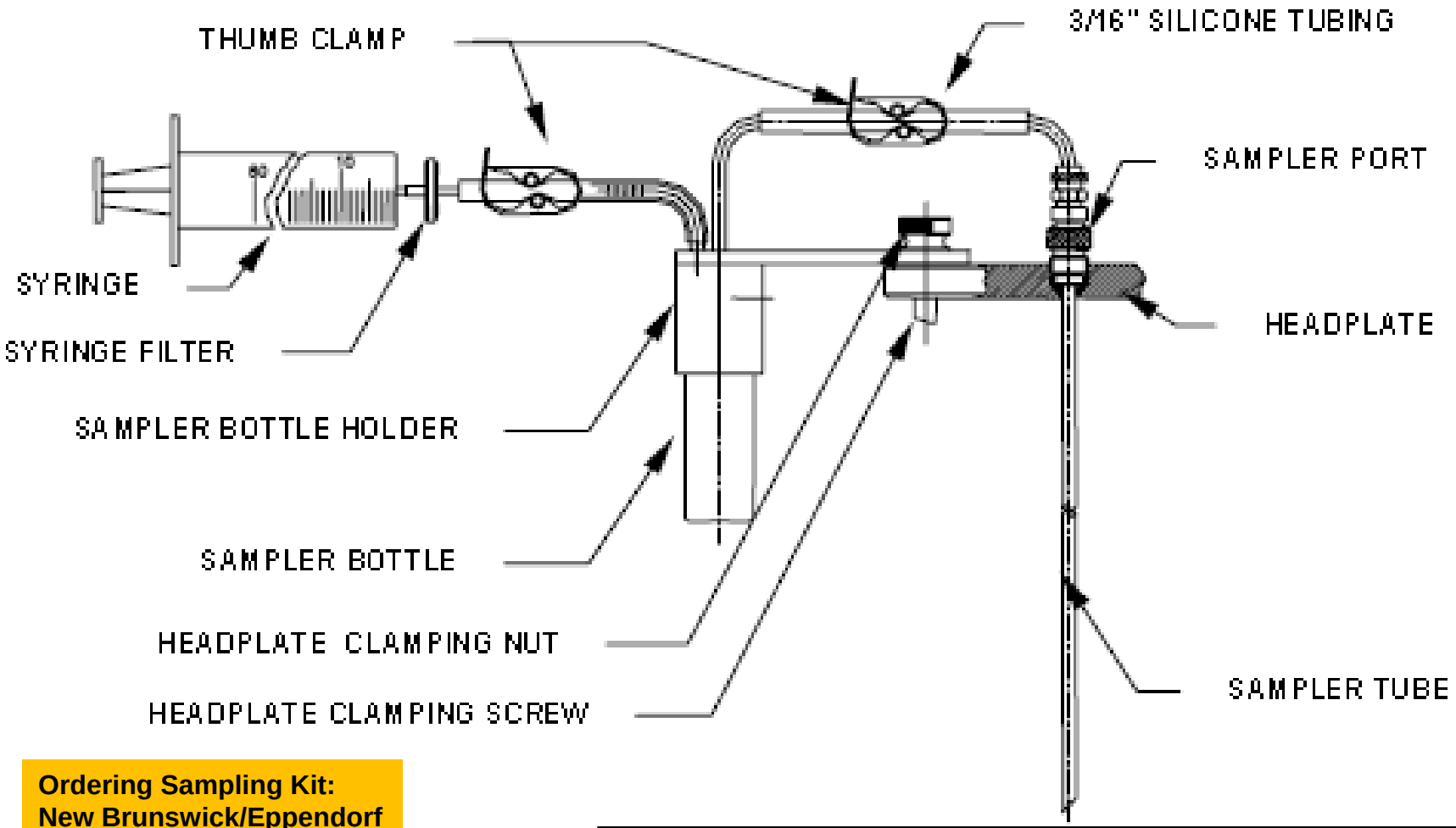
Components

Level	Item Seq	Op Seq	Item	Description	Rev	UOM	Quantity	Item Status	Item Category	Rev Description
1	1	1	M1273-5034	CONDENSER ASSEMBLY - 0.9L/2L	C	EA	1.000	Active	02.04.085	
.2	1	10	M1273-9490	CAP - 0.9L/2L/5L	B	EA	1.000	Active	02.04.080	
.2	2	10	M1169-5040C	CORE WELDMENT_CERTIFIED	A	EA	1.000	Active	09.04.080	
.2	3	10	M1273-9242	CAP/TUBE WELDMENT 0.9L/2L	H	EA	1.000	Active	02.04.080	
.2	4	10	M1169-6000	GASKET	A	EA	1.000	Active	09.02.061	
1	2	1	P0200-0495	FILTER,ABSOLUTE,1/4"-1/2"OD	D	EA	1.000	Active	02.02.080	
1	3	1	P0740-2501	TUBING SLCN .187"ID .093"WALL	F	FT	0.170	Active	01.02.055	

Bioprocessing: Exhaust Condenser and Solenoid Valve Connections


MOUNTING BRACKET
VALVE SPLITTER
PLUG: connect to rear panel of Power Controller (see Figure 2)
HOSE BARB 1: connect to water source, downstream of pressure regulator
HOSE BARB 2: connect to cooling coil or water jacket inlet
VALVE BODY
FILTER
WATER OUTLET
WATER INLET
SET SCREW in port adapter
EXHAUST PORT
HEADPLATE
Connect to cool water supply line that by-passes the solenoid valve used for the cooling coil or water jacket.
Connect to cooling coil or water jacket.

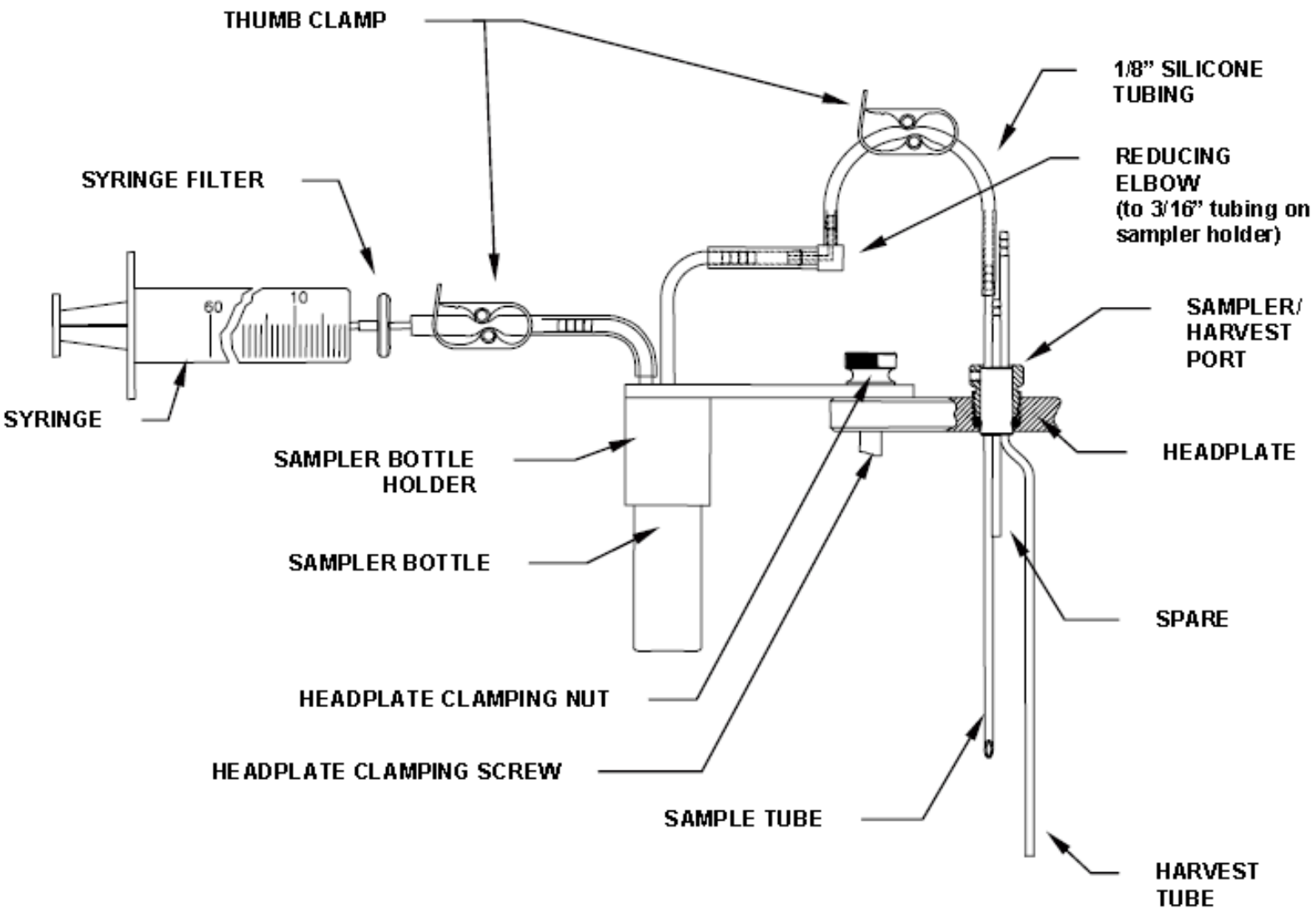
Bioprocessing: Sampler System



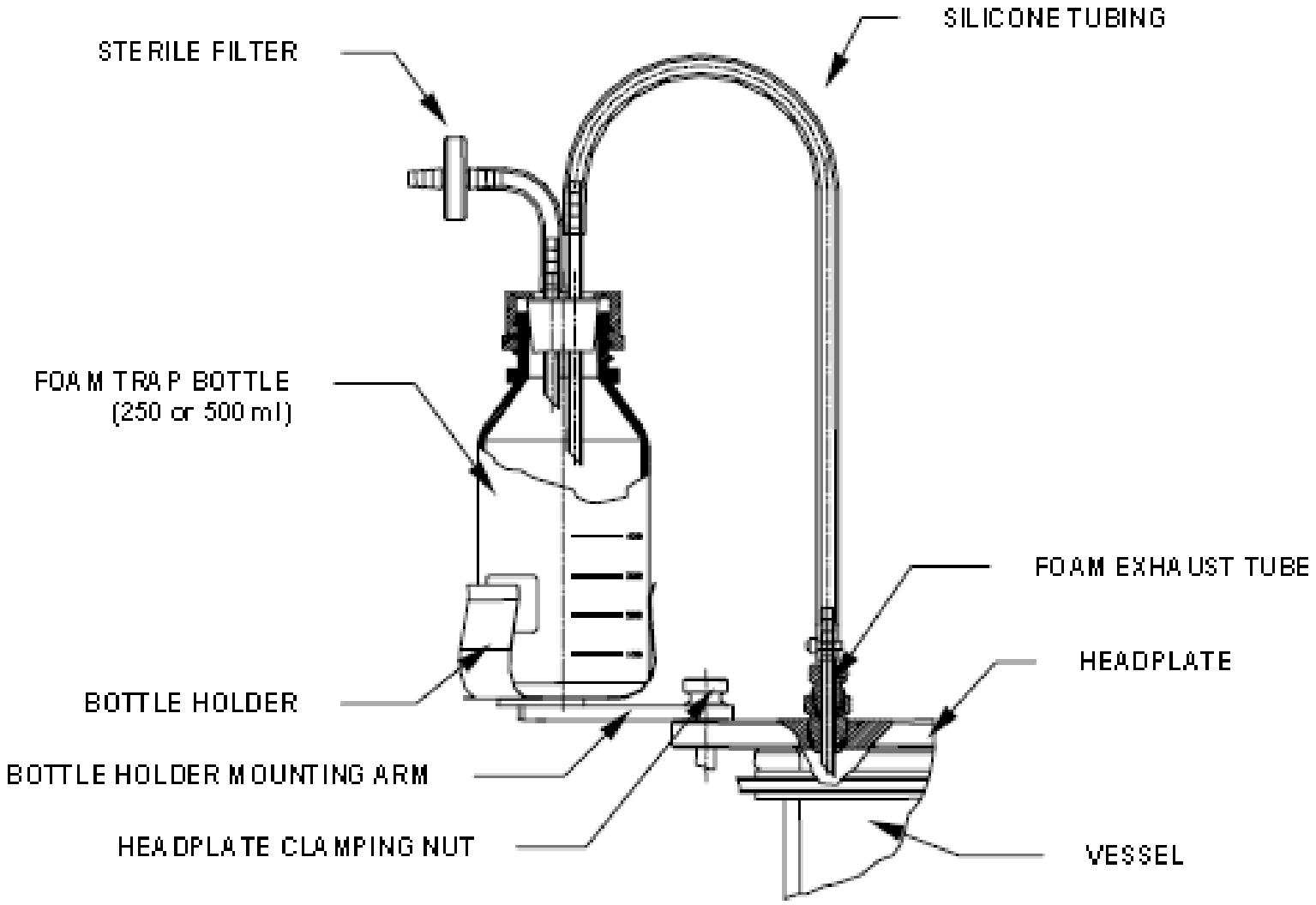
Ordering Sampling Kit:
New Brunswick/Eppendorf
M2373-9953
102 Motor Parkway
Hauppauge NY 11788
Tel 516-334-7500

Note: Take extreme care not to bend any hollow tubes. If only slightly bent, ferrules and other attachment fittings cannot be moved and the entire tube may need to be replaced.

Bioprocessing: 1.3L Sampler/Harvesting



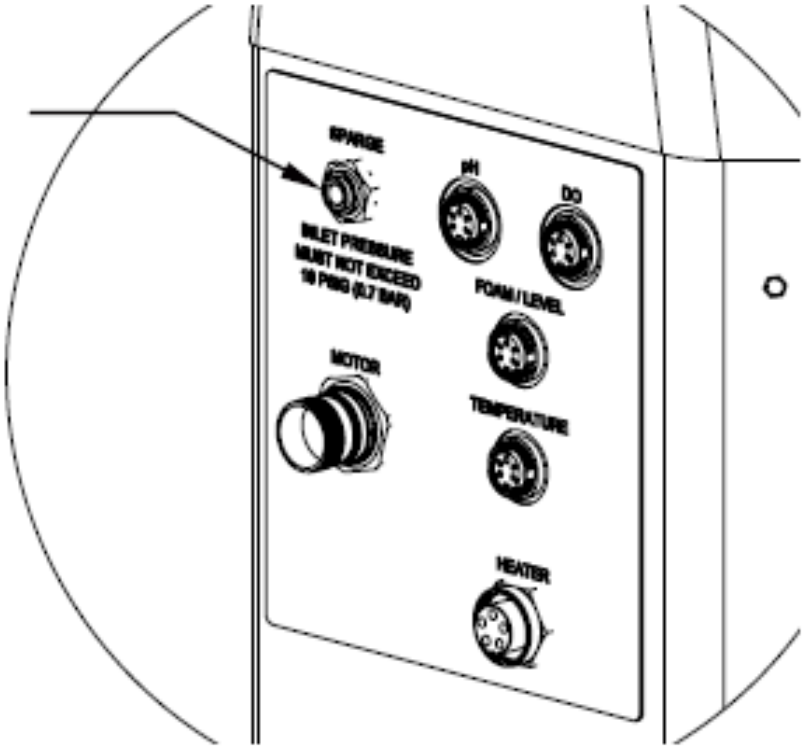
Bioprocessing: Foam Trap



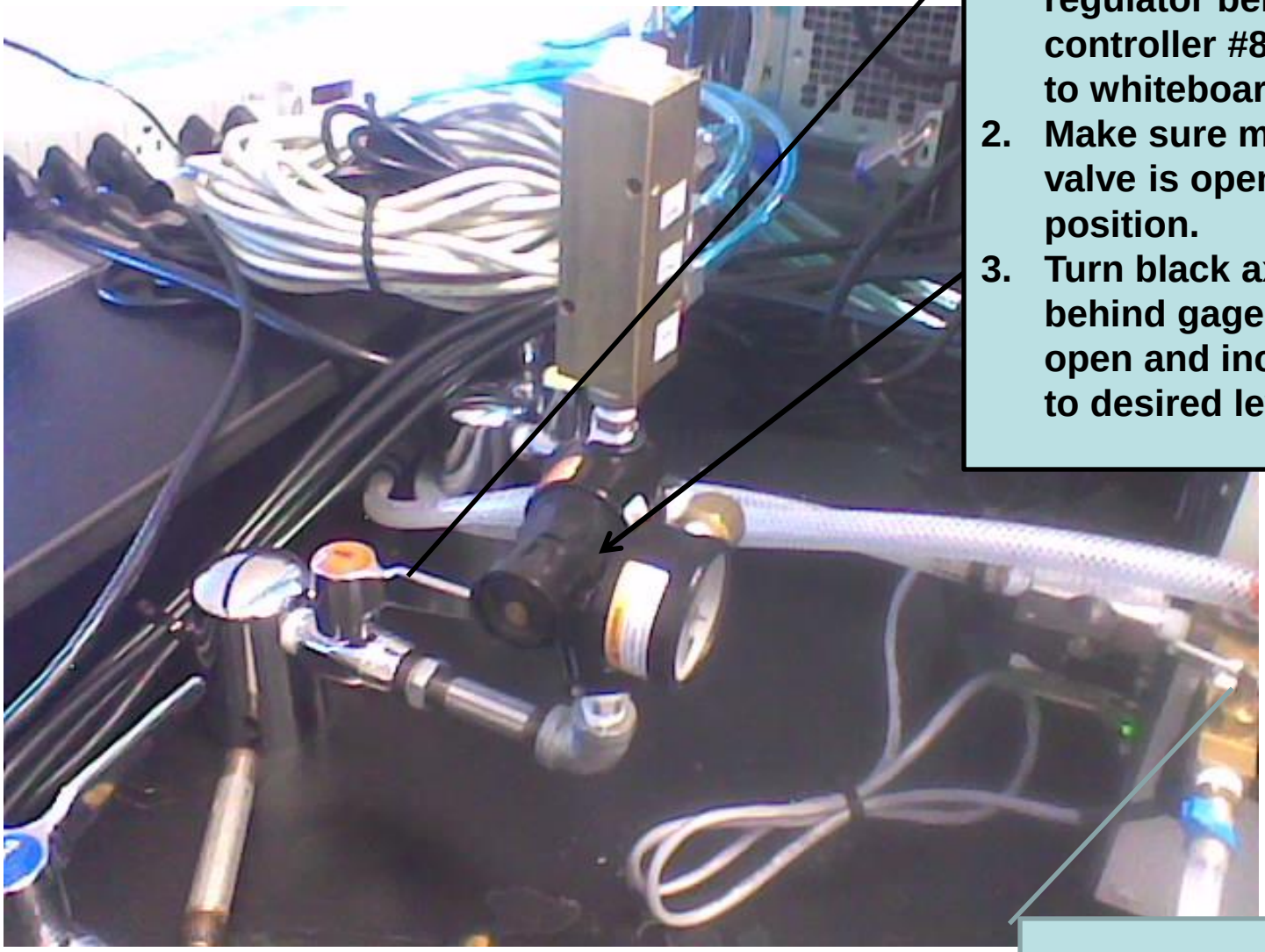
Bioprocessing: BioFlo115; Sparge Connections

Figure 1h: Sparge Connection (detail from Figure 1d)

Connect the barbed sparge connector here.



Bioprocessing: Lab Air, Bench Valve and Regulator



1. Locate AIR valve and regulator behind the NB controller #8 stack (closest to whiteboard)
2. Make sure main chrome valve is open (in –line) position.
3. Turn black axial valve behind gage clockwise to open and increase pressure to desired level (10-15 psi)

Rear of Controller # 8 stack

Bioprocessing: Autoclaving, Objectives and Methods

A. To minimize pressure differences throughout the sterilization process by ensuring that the air can transfer freely between the inside and the outside of the vessel;
B. To ensure that minor pressure differences do not expel liquid from the vessel by clamping off all penetrations that go below liquid level;
C. To protect hydrophobic filters from blockage, which would occur if condensation were allowed to wet and block the filter surface;
D. To protect susceptible vessel assembly components from steam damage.

The first objective is met by leaving at least one vessel port open, the second by clamping shut flexible tubing attached to immersed penetrations, and the third by wrapping filters with a protective cap of aluminum foil. Use protective caps on probes and bearings to meet the fourth objective.

1. Remove the motor from the top of the vessel and carefully put it aside.
2. Lubricate the vinyl bearing housing cap with silicone grease to facilitate sliding the cap securely onto the housing.
3. Place the bearing housing cap on the top of the bearing housing.
4. Disconnect the air and/or gas lines from the inlet filter on the sparger.
5. Disconnect the water lines. Remove all PVC tubing.
6. Clamp off the harvest tube, the sample tube and all other penetrations that are immersed in the media.
7. Remove the RTD from the thermowell.
8. Disconnect all probes and sensors, and remove their cables.
9. If you are using pH and DO probes, install each probe's shorting cap (provided in the probe kit).
10. Before placing the vessel into the autoclave, loosen the glass sample bottle by ½ turn.
11. Wrap all filters with aluminum foil to protect them from steam.
12. Attach a piece of tubing, wrapped with some non-absorbent material (such as glass wool or non-absorbent cotton) to each of the addition ports. Wrap foil around the end of the tubing, shaped like a funnel, to allow the vessel to vent more easily during autoclaving. Place a clamp on the tubing.

NOTE:

Be sure to leave one clamp open during autoclaving to equalize pressure.

If you have addition, foam trap or harvest bottles mounted at the base of the vessel, you can autoclave them with the vessel. Without detaching their tubing from the headplate:

13. Remove the bottle holder(s) and reinstall each on one of the headplate clamping screws.
14. Reinsert the bottle and turn the holder until the bottle and holder are positioned over the headplate, rather than extended over the edge.
15. Finger tighten the knurled nut.
16. Clamp off the tubing, and, where appropriate, remove it from the pump.

Bioprocessing: Autoclave, Initial Steps with Hardware

Bioprocessing: Autoclaving, Media Notes

- If you will be doing batch fermentation, be sure the vessel is filled with media so the media will also be sterilized.
- If you will be using heat-liable media, use at least 100 ml of a balanced salt solution (such as phosphate-balanced saline solution). Sterilize the media separately, after autoclaving the vessel.

1. If you have a vessel assembly that is too tall for your autoclave, carefully lay the vessel, still mounted in its stand if present, in the optional angled autoclave rack (*part number XMF-8624/M1227-9231—see Figure 31 below*). Secure it in place with the strap.

2. **If the vessel is not water-jacketed, skip to Step 3.** If the vessel is water-jacketed, the jacket should be half full for autoclaving (*see Section 4.8.3 for instructions on filling the jacket*). Make sure that the Water In line connected to the bottom of the jacketed vessel is pinched closed, to avoid water leaking from the jacket during autoclaving.

3. Insert the entire vessel assembly (glass jar, vessel stand if present, headplate and all headplate components) into an autoclave and sterilize.

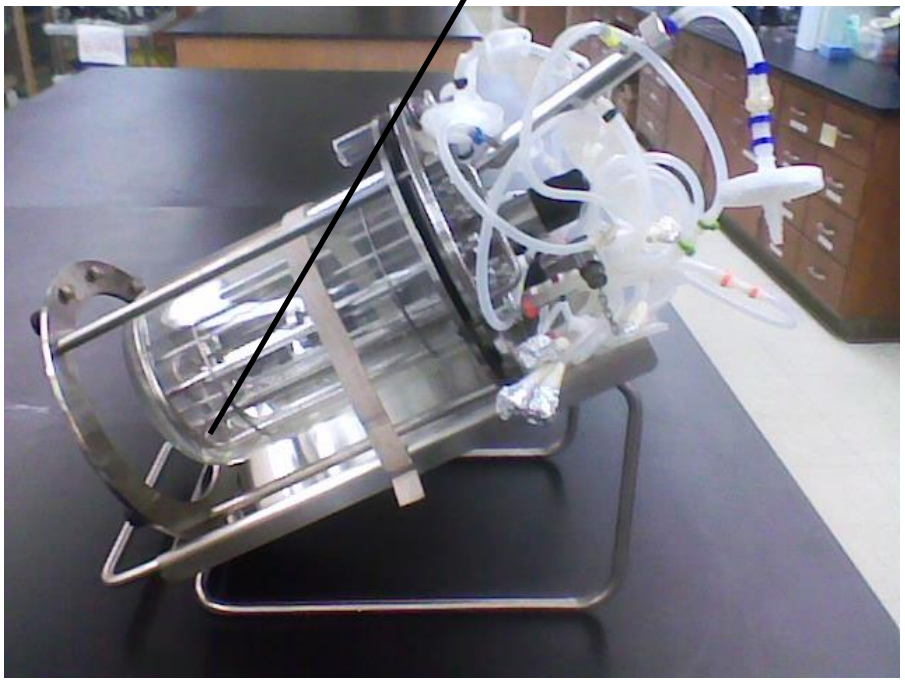
4. When you remove the vessel from the autoclave, immediately crimp the foil funnel on the addition port and close off the vent tubing to maintain sterility.

Bioprocessing: Vessel Autoclaving, Liquids Cycle 253C

Wrap all filter ends with aluminum foil to protect from steam and condensation

Add 1-2L liquid to cover pH and DO probes and orient vessel on cradle to cover the ends of the probes.

Make sure the vessel is vented to avoid overpressure and potential cracking of the vesel.



Bioprocessing: Service/Repair, Training Info

pH Probe: Email to Mettler-Toledo for Quote on pH probe: 405-DPAS-SC-K8S/325
mtprous@mt.com

Other Probes or New Brunswick items: Get Part number from Manual , send to Teri Hacker

Chiller: Thermo-Sci, Get quote from
Fisher Scientific

FISHER SCIENTIFIC COMPANY LLC
4500 TURNBERRY DRIVE
HANOVER PARK IL 60133-5491

Bioprocessing Training: Nov 10 to BS, BM by: Toby Mapes (toby.mapes@gmail.com)

Tubing Order Info PO to Cole-Palmer per TH 1/20/11

Item	Commodity	Description
1		EW-06422-05 Clear C Flex tubing 1/4" OD
2		FF-98906-04 Tubing Pt cured silicone 1/4"ID 300'
3		EW-06508-16 Masterflex Pharmed BPT tubing #16
4		s&h

Bioprocessing: Tubing, MasterFlex, Sizes

Masterflex L/S®
PRECISION PUMP TUBING

		PRECISION			
		L/S® 13	L/S® 14	L/S® 16	L/S® 25
Inside diameter* / Hose barb size*	in. (mm) / in. (mm)	0.03 (0.8) / 1/16 (1.6)	0.06 (1.6) / 1/16 (1.6)	0.12 (3.1) / 1/8 (3.2)	0.19 (4.8) / 3/16 (4.8)
Flow range† with 6 to 600 rpm drive‡	mL/min	0.36 to 36	1.3 to 130	4.8 to 480	10 to 1000
Flow range† with 1 to 100 rpm drive‡	mL/min	0.06 to 6	0.21 to 21	0.8 to 80	1.7 to 170
Maximum pressure**	continuous	25 psig (1.7 bar)			20 psig (1.4 bar)
Maximum pressure**	intermittent	40 psig (2.7 bar)			35 psig (2.4 bar)
Maximum vacuum** Suction lift		26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)			

*Nominal size. †Values in parentheses only obtained with High-Performance pump head.
‡Flow ranges are approximate—calculated under the following conditions: 0 psi at inlet, 0 psi at outlet, water circulated at 72°F (22°C).
**Actual performance varies depending upon tubing formulation.

PUMP TUBING		HIGH-PERFORMANCE PUMP TUBING			
L/S® 17	L/S® 18	L/S® 15	L/S® 24	L/S® 35	L/S® 36
0.25 (6.4) 1/4 (6.4)	0.31 (7.9) 1/8 (9.5)	0.19 (4.8) 3/16 (4.8)	0.25 (6.4) 1/4 (6.4)	0.31 (7.9) 1/8 (9.5)	0.38 (9.7) 3/8 (9.5)
17 to 1700	23 to 2300	10 to 1000 (11 to 1100)	17 to 1700 (18 to 1800)	23 to 2300 (26 to 2600)	29 to 2900 (34 to 3400)
2.8 to 280	3.8 to 380	1.7 to 170 (1.8 to 180)	2.8 to 280 (3.0 to 300)	3.8 to 380 (4.3 to 430)	4.8 to 480 (5.8 to 580)
15 psig (1.0 bar)	10 psig (0.7 bar)	25 psig (1.7 bar)		20 psig (1.4 bar)	15 psig (1.0 bar)
20 psig (1.4 bar)	15 psig (1.0 bar)	40 psig (2.7 bar)		35 psig (2.4 bar)	20 psig (1.4 bar)
20" Hg (510 mm Hg) 22 ft H_2O (6.7 m H_2O)		26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)			24" Hg (610 mm Hg) 27 ft H_2O (8.3 m H_2O)

L/S® PharMed® High-Pressure Tubing

Use only with the L/S® High-Performance pump head and any L/S® 11 to 100 rpm drive capable of running two or more pump heads.
EL-06485-15 L/S® 15HP tubing. Flow range: 0.9 to 90 mL/min.
Maximum continuous pressure: 100 psig (6.8 bar). 25 ft (7.6 m) per pack.
EL-06485-15 L/S® 15HP tubing. Flow range: 1.7 to 170 mL/min.
Maximum continuous pressure: 80 psig (5.5 bar). 25 ft (7.6 m) per pack.

L/S® PTFE-Tubing Sets

Include two 15" (38-cm) lengths—cannot be substituted with ordinary PTFE tubing.
EL-77380-50 PTFE-tubing. 3-mm ID, 6-mm OD. Set of two.
EL-77380-90 PTFE-tubing. 4-mm ID, 6-mm OD. Set of two.

Masterflex L/S®
PUMP TUBING ORDERING INFORMATION

Tubing formulation		L/S® 13	L/S® 14	L/S® 16	L/S® 25
Silicone (platinum)	25 ft (7.6 m)/pk	EL-96410-13	EL-96410-14	EL-96410-16	EL-96410-25
Silicone (peroxide)	25 ft (7.6 m)/pk	EL-96400-13	EL-96400-14	EL-96400-16	EL-96400-25
Tygon® Silicone	25 ft (7.6 m)/pk	EL-96420-13	EL-96420-14	EL-96420-16	EL-96420-25
New Tygon® Extended-Life Silicone	25 ft (7.6 m)/pk	EL-96440-13	EL-96440-14	EL-96440-16	EL-96440-25
C-FLEX® (50 A)	25 ft (7.6 m)/pk	EL-96424-13	EL-96424-14	EL-96424-16	EL-96424-25
Tygon® LFL	25 ft (7.6 m)/pk	EL-96429-13	EL-96429-14	EL-96429-16	EL-96429-25
Tygon® food (B-44-4X)	50 ft (15.2 m)/pk	EL-96419-13	EL-96419-14	EL-96419-16	EL-96419-25
Tygon® lab (R-3603)	50 ft (15.2 m)/pk	EL-96409-13	EL-96409-14	EL-96409-16	EL-96409-25
Tygon® food & lubricant	50 ft (15.2 m)/pk	EL-96401-13	EL-96401-14	EL-96401-16	EL-96401-25
PharMed® (85)	25 ft (7.6 m)/pk	EL-96485-13	EL-96485-14	EL-96485-16	EL-96485-25
Norprene® (A 60 G)	50 ft (15.2 m)/pk	EL-96404-13	EL-96404-14	EL-96404-16	EL-96404-25
Norprene® food (A60F)	50 ft (15.2 m)/pk	EL-96402-13	EL-96402-14	EL-96402-16	EL-96402-25
Viton®	25 ft (7.6 m)/pk	EL-96412-13	EL-96412-14	EL-96412-16	EL-96412-25

L/S® 17	L/S® 18	L/S® 15	L/S® 24	L/S® 35	L/S® 36
EL-96410-17	EL-96410-18	EL-96410-15	EL-96410-24	EL-96410-35	EL-96410-36
EL-96400-17	EL-96400-18	EL-96400-15	EL-96400-24	EL-96400-35	EL-96400-36
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EL-96412-17	EL-96412-18	EL-96412-15	EL-96412-24	EL-96412-35	EL-96412-36

Masterflex I/P®
PRECISION PUMP TUBING

	PRECISION PUMP TUBING			HIGH
Tubing cross sections	I/P® 26	I/P® 73	I/P® 82	I/P® 70
Inside diameter* / Hose barb size*	in. (mm) / in. (mm)	0.25 (6.4) 1/4 (6.4)	0.37 (9.5) 1/8 (9.5)	0.5 (12.7) 1/2 (12.7)	0.37 (9.5) 3/8 (9.5)
Flow range† with 20 to 650 rpm drive	GPM (LPM)	0.03 to 1 (0.12 to 4)	0.05 to 2.1 (0.2 to 8)	0.1 to 3.5 (0.4 to 13)	0.06 to 2.1 (0.3 to 8)
Flow range† with 100 to 650 rpm drive	GPM (LPM)	0.2 to 1.1 (0.8 to 4)	0.3 to 2.1 (1.2 to 8)	0.5 to 3.4 (2 to 13)	0.3 to 2.1 (1.2 to 8)
Max. pressure**	continuous	25 psi (1.7 bar)		10 psi (0.7 bar)	25 psi (1.7 bar)
	intermittent	40 psi (2.7 bar)		20 psi (1.4 bar)	40 psi (2.7 bar)
Maximum vacuum** Suction lift		26" Hg (660 mm Hg) 29 ft H_2O (8.8 m H_2O)		25" Hg (510 mm Hg) 23 ft H_2O (7.0 m H_2O)	29

*Nominal size. ‡Values in parentheses only obtained with High-Performance pump head.
†Flow ranges are approximate—calculated under the following conditions: 0 psi at inlet, 0 psi at outlet, water circulated at 72°F (22°C).
**Actual performance varies depending upon tubing formulation.

Masterflex I/P®
PUMP TUBING ORDERING INFORMATION

Tubing formulation		I/P® 26	I/P® 73	I/P® 82	I/P® 70
Silicone (platinum)	25 ft (7.6 m)/pk	EL-96410-26	EL-96410-73	EL-96410-82	EL-96410-70 (10 ft/pk)
Silicone (peroxide)	25 ft (7.6 m)/pk	EL-96400-26	EL-96400-73	EL-96400-82	EL-96400-70 (10 ft/pk)
Tygon® Silicone (platinum)	25 ft (7.6 m)/pk	EL-96420-26	EL-96420-73	EL-96420-82	EL-96420-70
New Tygon® Extended-Life Silicone (platinum)	25 ft (7.6 m)/pk	EL-96440-26	EL-96440-73	EL-96440-82	EL-96440-70
C-FLEX® (50 A)	25 ft (7.6 m)/pk	EL-96424-26	EL-96424-73	EL-96424-82	EL-96424-70 (10 ft/pk)
Tygon® LFL	25 ft (7.6 m)/pk	EL-96429-26	EL-96429-73	EL-96429-82	EL-96429-70
Tygon® food (B-44-4X)	50 ft (15.2 m)/pk	EL-96419-26	EL-96419-73	EL-96419-82	EL-96419-70
Tygon® lab (R-3603)	50 ft (15.2 m)/pk	EL-96409-26	EL-96409-73	EL-96409-82	EL-96409-70
Tygon® food & lubricant	50 ft (15.2 m)/pk	EL-96401-26	EL-96401-73	EL-96401-82	EL-96401-70
PharMed® (85)	25 ft (7.6 m)/pk	EL-96485-26	EL-96485-73	EL-96485-82	EL-96485-70
Norprene® (A 60 G)	50 ft (15.2 m)/pk	EL-96404-26	EL-96404-73	EL-96404-82	EL-96404-70 (25 ft/pk)
Norprene® food (A 60 F)	50 ft (15.2 m)/pk	EL-96402-26	EL-96402-73	EL-96402-82	EL-96402-70 (25 ft/pk)
Viton®	25 ft (7.6 m)/pk	EL-96412-26	EL-96412-73	—	—

MasterFlex® Pump Tubing
Chemical Compatibility Tables

We assume no responsibility for the use of this information in specific applications. Test only under specified conditions of your application to ensure safe use of a chemical. Immersion testing methods are preferred for more accurate test results.

Immersion testing procedure:

We recommend an immersion test to check compatibility. Always pretest with unknown or marginal chemicals. Immerse a sample length of tubing for at least 48 hours in a closed vessel containing the fluid to be pumped. Examine the tubing for swelling, embrittlement, cracking, softness, or other signs of deterioration. If there's no change in the tubing, try it in your pump.

Chemical compatibility is indicated by five general ratings:

- **A** = No effect; little noticeable change.
- **B** = Minor effect; slight corrosion or discoloration.
- **C** = Moderate effect; not recommended for continuous use; softening, loss of strength, swelling and/or shrinkage.
- **D** = Severe effect; not recommended for any use.
- — = No data available.

All ratings in the chemical compatibility tables at right are determined at 70°F (21°C). Higher temperatures will decrease the chemical resistance of tubing.

LEGEND

Tubing formulation	Pump head material
PN = PharMed®, High-Pressure PharMed®, Norprene®, Norprene food	PSF = Polysulfone
CF = C-FLEX®	PC = Polycarbonate
S = Silicone (peroxide and platinum), Tygon® Silicone, Tygon® Extended Life Silicone	PPS = Polyphenylene sulfide
T = Tygon®, Tygon® Food, Tygon® LFL	SS = Stainless steel
TU = Tygon® Fuel & Lubricant	
V = Viton®	
PT = Polytetrafluoroethylene (PTFE)	

C-FLEX—Reg TM Consolidated Polymer Technologies, Inc.
Freon—Reg TM E.I. Du Pont de Nemours & Co.
Viton—Reg TM DuPont Dow Elastomers L.L.C.
Masterflex—Reg TM Cole-Parmer Instrument Co.
Norprene, PharMed, Tygon—Reg TM St. Gobain Performance Plastics Corp.

CAUTION
Variations in temperature, pressure, or concentration may cause serious injury or fatality. Test tubing only under your specific conditions. Before using any chemical, read the material safety data sheet (MSDS).

WARNING
Masterflex® pumps are not designed or intended for medical use in the treatment of patients and, accordingly, have not been submitted to, or received approval from, the FDA as devices for medical use.

Fluid	Tubing							Pump head material			
	PN	CF	S	T	TU	V	PT	PSF	PC	PPS	SS
Acetaldehyde	A	—	B	D	D	D	A	D	—	A	A
Acetate LMW	A	C	—	D	D	—	A	D	—	A	A
Acetic acid <5%	A	B	B	A	C	—	A	A	A	A	B
Acetic acid <5%	A	C	B	B	D	—	A	A	C	A	B
Acetic anhydride	A	—	D	D	D	D	A	D	D	A	B
Acetone	D	D	D	D	D	D	A	D	D	A	A
Acetonitrile	A	—	—	D	D	D	A	D	D	A	A
Acetyl bromide	D	C	—	D	D	—	A	—	—	—	—
Acetyl chloride	D	C	C	D	D	A	A	D	D	A	A
Air	A	A	A	A	A	A	A*	A	A	A	A
Aliphatic hydrocarbons	C	D	—	C	C	—	A	—	—	—	B
Aluminum chloride	A	B	B	A	A	A	A	A	A	A	D
Aluminum sulfate	A	B	A	A	—	A	A	A	A	A	B
Alums	A	B	—	A	A	—	A	—	—	—	—
Ammonia, gas and liquid	A	B	—	B	B	D	A	A	D	A	B
Ammonium acetate	C	B	—	A	A	—	A	—	A	—	B
Ammonium carbonate	A	B	C	A	A	—	A	A	—	A	B
Ammonium chloride	A	B	C	A	A	A	A	A	—	A	C
Ammonium hydroxide	A	B	A	B	D	A	A	A	D	A	A
Ammonium nitrate	A	B	C	A	A	—	A	A	—	A	A
Ammonium phosphate	A	B	—	A	A	—	A	A	A	A	B
Ammonium sulfate	A	B	A	A	A	A	A	A	A	A	B
Amyl acetate	A	A	D	D	D	A	A	D	D	A	A
Amyl alcohol	B	D	D	D	B	A	A	A	—	A	A
Amyl chloride	A	D	D	B	B	—	A	D	D	D	A
Aniline	C	—	B	D	D	—	A	D	D	A	A
Aniline hydrochloride	C	—	—	D	D	D	A	—	D	—	D
Aqua regia (80% HCl, 20% H)	C	B	—	D	D	—	A	D	D	D	D
Aromatic hydrocarbons	D	D	—	D	B	—	—	—	—	—	B
Arsenic salts	A	B	—	A	A	—	—	—	—	—	—
Barium salts	A	B	A	A	A	—	A	A	—	A	B
Benzaldehyde	C	D	—	D	B	D	A	C	C	A	B
Benzenesulfonic acid	D	A	D	B	B	A	A	D	D	A	B
Bleaching liquors	A	B	B	B	B	A	A	—	—	—	—
Boric acid	A	B	A	D	A	A	A	A	A	A	B
Bromine	D	B	D	D	D	A	A	—	D	D	D
Butane	C	D	D	B	B	A	A	—	—	A	A
Butanol (butyl alcohol)	C	B	B	B	D	A	A	A	C	A	A
Butyl acetate	D	D	D	D	D	D	A	D	D	A	B
Butyric acid	A	B	D	D	B	—	A	—	—	—	B
Calcium oxide	A	B	D	A	A	—	A	—	—	A	B
Calcium salts	A	B	B	A	A	—	A	A	—	A	B
Carbon bisulfide	D	D	—	D	D	—	A	—	—	—	A
Carbon dioxide	A	B	B	A	D	A	A*	—	A	A	B
Carbon tetrachloride	D	—	D	D	D	A	A	A	D	A	B
Chlorine, dry	D	B	D	A	B	A	A*	D	—	D	A
Chlorine, wet	D	B	D	D	B	B	A	D	—	D	C
Chloroacetic acid	A	B	—	D	D	D	A	D	D	A	B
Chlorobenzene	D	D	D	D	D	A	B	D	D	A	A
Chlorobromomethane	B	D	D	D	D	A	A	D	—	—	—
Chloroform	D	D	D	D	D	A	A	D	—	A	A
Chlorosulfonic acid	D	B	D	B	B	D	A	D	—	—	D
Chromic acid, 30%	A	B	D	—	A	A	—	D	D	A	B
Chromium salts	A	B	—	A	A	—	—	—	—	—	—
Copper salts	A	B	A	A	A	—	A	—	—	A	B
Cresol	C	D	—	D	D	A	A	D	D	A	A
Cyclohexane	D	D	D	D	C	A	A	A	B	A	A
Cyclohexanone	D	D	D	D	D	D	A	D	D	A	B
Diacetone alcohol	A	B	—	D	D	—	A	—	D	A	A
Dimethyl formamide	D	D	—	D	D	D	A	D	D	A	A
Essential oils	A	B	C	B	B	—	—	—	—	—	—
Ethanol (ethyl alcohol)	C	B	B	B	B	A	A	B	B	A	A
Ether	D	B	D	D	D	—	A	D	D	A	A
Ethyl acetate	C	D	D	D	D	D	A	A	D	A	B
Ethyl bromide	D	D	D	D	D	—	A	—	—	—	—
Ethyl chloride	D	B	D	D	D	A	A	D	D	—	A
Ethylamine	D	A	C	D	D	D	—	—	—	—	—
Ethylene chlorohydrin	D	B	C	D	D	A	A	D	D	A	B
Ethylene dichloride	D	B	D	D	D	B	A	D	D	A	B
Ethylene glycol	A	B	A	B	B	A	A	A	C	A	B
Ethylene oxide	B	B	D	B	B	A	A	A	D	D	B
Fatty acids	A	B	C	A	A	D	A	A	—	C	B
Ferric chloride	A	A	B	A	A	B	A	A	—	A	D
Ferric sulfate	A	A	C	A	A	A	A	A	—	A	B
Ferrous chloride	A	A	C	A	A	—	A	D	—	A	D
Ferrous sulfate	A	A	C	A	A	—	A	A	A	A	B
Fluoboric acid	A	A	—	A	A	—	—	A	—	A	B
Fluoroborate salts	A	B	—	A	A	—	—	—	—	—	—
Fluosilicic acid	A	A	—	A	B	—	A	A	—	A	C
Formaldehyde	A	A	B	B	B	D	A	A	D	A	B
Formic acid	A	B	C	B	B	D	A	C	D	A	B
Freon® TMS	D	D	—	D	D	—	A	—	D	A	A
Gasoline, high-aromatic	D	D	D	D	B	A	A	A	C	A	—
Gasoline, nonaromatic	D	D	D	D	B	A	A	A	A	A	A

*Do not use the USP PTFE-tubing pump with gases due to excessive heat build-up.

Fluid	Tubing							Pump head material			
	PN	CF	S	T	TU	V	PT	PSF	PC	PPS	SS
Glucose	A	A	A	A	A	A	A	—	A	—	A
Glue, PVA	A	A	A	A	A	A	A	—	—	—	A
Glycerin	A	B	A	A	A	A	A	A	A	A	A
Hydriodic acid	D	B	—	A	A	—	—	—	—	—	—
Hydrobromic acid, 30%	B	B	D	A	A	A	A	B	D	A	D
Hydrochloric acid (dil)	A	B	D	A	B	A	A	A	A	A	D
Hydrochloric acid (med)	—	B	D	A	B	B	A	A	D	D	D
Hydrochloric acid (conc)	—	B	D	A	B	B	A	A	B	D	D
Hydrocyanic acid	A	A	C	A	A	A	A	—	—	—	B
Hydrocyanic acid, gas, 10%	A	A	C	A	A	A	A	—	—	—	—
Hydrofluoric acid, 50%	—	A	D	C	D	A	A	—	D	A	D
Hydrofluoric acid, 75%	—	A	D	D	D	B	A	—	D	A	D
Hydrogen peroxide (dil)	A	A	A	A	A	A	A	A	A	—	B
Hydrogen peroxide, 90%	A	D	C	D	A	—	A	A	A	—	B
Hypochlorous acid	A	A	D	A	D	A	A	—	—	—	—
Iodine solutions	A	D	C	A	A	—	A	—	D	D	D
Iodoform	—	—	—	—	—	—	C	—	—	—	A
Kerosene	D	D	D	D	B	A	A	A	A	A	A
Ketones	D	D	—	D	D	—	A	D	D	A	A
Lacquer solvents	D	D	D	D	D	D	A	A	A	A	A
Lactic acid	A	A	A	A	A	A	A	A	A	A	B
Lead acetate	A	B	D	B	A	—	A	A	—	A	B
Linseed oil	A	D	—	A	A	A	A	A	A	A	A
Lithium hydroxide	B	A	D	A	A	—	A	—	D	A	B
Magnesium chloride	A	A	A	A	A	A	A	A	A	A	B
Magnesium sulfate	—	A	A	A	A	A	A	A	—	A	B
Malic acid	A	B	B	A	A	A	A	—	—	—	A
Manganese salts	A	B	B	A	A	—	A	—	—	—	B
Mercury salts	A	B	—	A	A	—	A	—	—	—	B
Methane	A	D	—	A	A	A	A*	—	—	—	A
Methanol (methyl alcohol)	A	—	A	C	C	D	A	A	D	A	A
Methyl chloride	D	D	D	D	D	A	A	D	—	A	A
Methyl ethyl ketone (MEK)	C	—	D	D	D	D	A	D	D	A	A
Mixed acid (HNO_3, 15% HNO_3)	B	B	—	B	D	—	A	D	—	—	B
Molybdenum disulfide	—	B	—	—	—	—	—	—	—	—	—
Monoethanolamine	B	A	B	—	—	D	A	A	—	A	A
Naphtha	D	D	D	B	B	A	B	B	—	A	A
Natural gas	A	D	—	A	A	—	A*	—	—	A	A
Nickel salts	A	A	A	A	A	—	A	A	—	A	B
Nitric acid (dil)	A	A	C	A	D	A	A	A	C	A	A
Nitric acid (med)	C	—	D	A	D	A	A	C	C	B	A
Nitric acid (conc)	D	—	D	D	D	—	A	C	D	D	A
Nitrobenzene	D	D	D	D	D	—	A	D	D	A	B
Nitrogen oxides	D	B	D	A	A	—	A	—	—	—	—
Nitrous acid	A	A	—	A	A	—	A	—	—	—	B
Oils, animal	A	B	—	D	B	—	A	—	—	—	A
Oils, mineral	D	D	D	B	A	A	A	B	A	A	A
Oils, vegetable	A	—	A	B	A	—	A	A	—	A	A
Oleic acid	C	A	D	D	B	A	A	A	A	A	B
Oxalic acid, cold	A	A	B	A	A	—	A	—	A	A	B
Oxygen, gas	A	A	B	A	A	—	A*	A	A	—	A
Palmitic acid	—	—	D	—	—	A	A	—	—	—	B
Perchloric acid	D	A	D	D	D	A	A	D	D	A	C
Perchloroethylene	D	B	—	D	D	A	A	D	D	A	B
Phenol (carbolic acid)	—	D	D	B	B	—	A	A	D	—	B
Phosphoric acid, 50%	A	A	—	A	A	A	A	A	B	—	A
Phthalic acid	A	D	B	A	A	—	A	—	—	—	B
Plating solutions	A	B	D	A	A	A	A	—	—	—	—
Polyglycol	B	B	A	A	A	—	A	—	—	—	—
Potassium carbonate	B	A	—	A	A	—	A	—	A	A	B
Potassium chlorate	B	A	B	A	B	A	A	A	—	A	B
Potassium hydroxide (med)	A	A	B	D	D	A	A	A	D	—	B
Potassium hydroxide (conc)	A	A	C	D	D	B	A	A	D	—	B
Potassium iodide	B	A	—	A	D	—	A	—	—	—	A
Propanol (propyl alcohol)	C	—	A	D	D	B	A	B	A	A	A
Pyridine	C	D	D	D	D	D	A	D	D	A	A
Silicone fluids	A	A	—	B	B	—	A	—	—	A	A
Silicone oils	A	A	—	B	B	A	A	A	—	A	A
Silver nitrate	A	A	A	B	A	A	A	A	A	A	B
Soap solutions	A	A	B	A	A	A	A	A	A	A	A
Sodium bicarbonate	A	A	A	A	A	A	A	A	A	A	B
Sodium bisulfate	A	A	—	A	A	—	A	A	A	A	D
Sodium bisulfite	A	A	A	A	A	A	A	—	A	—	B
Sodium borate	A	A	A	A	A	A	A	A	A	A	B
Sodium carbonate	A	A	A	A	A	B	A	A	A	A	A
Sodium chlorate	A	A	C	B	B	—	A	A	A	A	B
Sodium chloride	A	A	B	A	B	A	A	A	A	A	C
Sodium ferrocyanide	A	A	—	B	B	—	A	A	—	A	B
Sodium hydrosulfite	B	A	—	A	A	—	A	A	—	A	—
Sodium hydroxide (dil)	A	A	A	D	D	B	A	A	D	A	A
Sodium hydroxide, 25%	C	B	B	D	B	B	A	A	D	A	B
Sodium hydroxide (conc)	—	C	—	B	D	B	A	—	D	A	C
Sodium hypochlorite, <5%	B	A	B	B	B	A	A	A	—	A	A
Sodium hypochlorite, >5%	C	A	B	B	B	B	A	A	—	A	C

Bioprocessing: Tubing, Chemical Compatibilility

Bioprocessing: Tubing, Features/Contraints pg 1/2

Formulation	Advantages	Application suitability	Limits	Physical characteristics	Temp. range	Meets classifications	Gas permeability*	Cleaning/ Sterilization
Silicone (platinum-cured) 96410	Excellent biocompatibility. No leachable additives, DOP, or plasticizers; phthalate and latex-free; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good over a wide temperature range. Weather, ozone, corona, and radiation resistant. Minimal tendency to take a set.	ACIDS Poor ALKALIES Poor ORGANIC SOLVENTS No PRESSURE Fair VACUUM Good VISCOUS FLUIDS Fair STERILE FLUIDS Excellent	Do not use with concentrated acids and bases, organic solvents, or oils.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material; flexible. Translucent, clear to light amber.	-58 to 446°F (-50 to 230°C)	USP Class V Extractables; exceeds Class VI implant; FDA 21 CFR 177.2600, 3A Sanitary Standards: Bulk Pharm. cGMPs (FDA 21 CFR 210/211	CO_2: 28,132 H_2: 6579 O_2: 7961 N_2: 2763	Clean with hot water/soap solution; use non-oily soap such as Ivory®, not synthetic detergent or oil-based soap as they may be absorbed by the tubing and into the fluid. Rinse well with distilled water. ETO sterilization not recommended—sufficient data is not available regarding complete outgassing of residual ETO and other ETO products.
Silicone (peroxide-cured) 96400	Excellent biocompatibility; no leachable additives, DOP, or plasticizers; odorless and nontoxic, fungus-resistant. No taste imparted to transported fluids. Extremely good at low temperatures. Weather ,ozone, corona, and radiation resistant. Minimal tendency to take a set.	ACIDS Poor ALKALIES Poor ORGANIC SOLVENTS No PRESSURE Fair VACUUM Good VISCOUS FLUIDS Fair STERILE FLUIDS Excellent	Do not use with concentrated solvents, oils, or acids. Relatively high gas permeability.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	-58 to 446°F (-50 to 230°C)	USP Class VI FDA 21 CFR 177.2600	CO_2: 20,132 H_2: 6579 O_2: 7961 N_2: 2763	Clean with isopropyl alcohol or hot water/soap solution. Use non-oily soap such as Ivory®. Do not use synthetic detergent or oil-based soap that may be absorbed by the tubing and leach into the fluid. Rinse thoroughly with distilled water. May use ethylene oxide (ETO) sterilization. Autoclavable.
Tygon® Silicone (platinum-cured) 96420	Ultra-smooth inner surface. Minimizes particle entrapment. Lower absorption; excellent biocompatibility; no leachable additives, DOP, or plasticizers. Odorless, nontoxic, fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant. Platinum-cured.	ACIDS Poor ALKALIES Poor ORGANIC SOLVENTS No PRESSURE Fair VACUUM Good VISCOUS FLUIDS Fair STERILE FLUIDS Excellent	Do not use with concentrated solvents, oils, acids, or dilute NaOH. Relatively high gas permeability.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	-68 to 232°F (-75 to 450°C)	USP Class VI FDA 21 CFR 175.300 Exceeds 3A sanitary standards	CO_2: 25,147 H_2: — O_2: 4715 N_2: 2284	To autoclave: coil loosely in non-linting cloth or paper; autoclave at 121°C (250°F), 1 bar (15 psi) for 30 minutes. Sterilize by ethylene oxide (ETO), autoclave, or gamma irradiation up to 2.5 Mrad.
Tygon® Extended-Life Silicone (platinum-cured) 96440	Platinum-cured silicone tubing with long life and ultra-smooth inner surface. Minimizes particle entrapment; lower absorption. Excellent biocompatibility. No leachable additives, DOP, or plasticizers; odorless, nontoxic. Fungus-resistant. No taste imparted to transported fluids. Weather, ozone, corona, and radiation resistant.	ACIDS Poor ALKALIES Poor ORGANIC SOLVENTS No PRESSURE Fair VACUUM Good VISCOUS FLUIDS Fair STERILE FLUIDS Excellent	Do not use with concentrated solvents, oils, acids, or dilute NaOH. Relatively high gas permeability.	Thermal set rubber. Siloxane polymers and amorphous silica. Excellent compression strength. Soft material. Translucent, clear to light amber.	60 to 232°F (-75 to 450°C)	USP XXII Class VI and FDA 21 CFR Part 177.2600 criteria; also exceeds 3A sanitary standard	CO_2: 25,147 H_2: — O_2: 4715 N_2: 2284	To autoclave: coil loosely in non-linting cloth or paper; autoclave at 121°C (250°F), 1 bar (15 psi) for 30 minutes. Sterilize by ethylene oxide (ETO), autoclave, or gamma irradiation up to 2.5 Mrad.
C-FLEX® (50-A) 06424	Physical properties similar to silicone with chemical compatibility of Tygon®. Inexpensive. Excellent biocompatibility. Smooth bore. Nontoxic, no leachable plasticizers. Lower gas permeability than silicone. Use with many acids and alkalies.	ACIDS Good ALKALIES Good ORGANIC SOLVENTS No PRESSURE Fair VACUUM Good VISCOUS FLUIDS Fair STERILE FLUIDS Excellent	Not recommended for use with oils. Moderate pump life.	Thermoplastic elastomer; Styrene-ethylene-butylene-modified block copolymer with silicone oil. Excellent tensile and tear strength. Soft material. Opaque, white.	-73 to 135°F (-100 to 275°C)	USP Class VI FDA 21 CFR 177.2600	CO_2: — H_2: — O_2: 150 N_2: —	Sterilize by ethylene oxide (ETO), gamma radiation, or autoclave.
Tygon® LFL 06429	Longest life of all Tygon® peristaltic tubing (1000 hrs) Nonaging, nonoxidizing. Clear for easy flow monitoring. Broad chemical resistance; low gas permeability. Smooth bore. Good for viscous fluids. High dielectric constant.	ACIDS Good ALKALIES Good ORGANIC SOLVENTS No PRESSURE Good VACUUM Good VISCOUS FLUIDS Excellent STERILE FLUIDS Poor	Potential leaching of plasticizer.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	-58 to 165°F (-50 to 74°C)	USP Class VI FDA 21 CFR 175.300	CO_2: 563 H_2: — O_2: 124 N_2: 67	Sterilize by ETO/autoclave. Coil loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 15 psi (1 kg/cm²), 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) for 2 to 2½ hrs until clear.

* $\frac{cc \times mm}{(cm^2 \times sec. \times cm\ Hg)} \times 10^{-10}$

Bioprocessing: Tubing, Features/Contraints pg 2/2

Formulation	Advantages	Application suitability	Limits	Physical characteristics	Temp. range	Meets classifications	Gas permeability*	Cleaning/ Sterilization
Tygon® Food (B-44-4X) 06419	Designed especially for handling food products; bore is extremely smooth (better than most stainless steels), nontoxic, will not affect taste or odor, and clear for CIP and flow verification. Excellent nonwetting properties permit flush cleaning and complete drainage. High dielectric constant.	Acids: Good Alkalies: Good Organic solvents: No Pressure: Good Vacuum: Good Viscous fluids: Excellent Sterile fluids: Good	Limited pumping life.	Thermoplastic PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	-47 to 165°F (-44 to 74°C)	FDA 21 CFR 175.300 NSF-listed (Standard 51) All 3A Sanitary Plastic Products Various USDA standards.	CO_2: 270 H_2: 97 O_2: 60 N_2: 30	Unaffected by commercial sanitizers (with recommended procedures). Sterilize with ethylene oxide (ETO) or autoclave. To autoclave: Coil loosely in nonlinting cloth or paper, autoclave at 121°C (250°F), 1kg/cm² (15 psi) for 30 minutes (tubing will appear milky); air dry at max 66°C (150°F) for 2 to 2½ hours until clear.
Tygon® Lab (R-3603) 06409	Inexpensive tubing for general lab applications. Nonaging, nonoxidizing. Clear for easy flow monitoring. Handles virtually all inorganic chemicals. Low gas permeability. Smooth bore; good for viscous fluids. High dielectric constant.	Acids: Good Alkalies: Good Organic solvents: No Pressure: Good Vacuum: Good Viscous fluids: Excellent Sterile fluids: Poor	Limited pump life. Potential plasticizer leaching.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, clear.	-58 to 165°F (-50 to 74°C)	FDA 21 CFR 175.300	CO_2: 360 H_2: 97 O_2: 40 N_2: 80	Sterilize by ETO or autoclave. Coil loosely in nonlinting cloth or paper; autoclave at 250°F (121°C), 15 psi (1 kg/cm²) for 30 minutes (tubing will appear milky); air dry at max 150°F (66°C) for 2 to 2-⅛ hours until clear.
Tygon® Fuel & Lubricant 06401	Specially formulated to transport hydrocarbons, petroleum products, and distillates. Suitable for gasoline, kerosene, heating oils, cutting fluids, and glycol-based coolants. Minimum extractability. Low gas permeability. High dielectric constant.	Acids: Good Alkalies: Good Organic solvents: No Pressure: Good Vacuum: Good Viscous fluids: Excellent Sterile fluids: Poor	Do not use with strong acids and alkalies. Potential leaching.	Thermoplastic. PVC-based material with plasticizer. Firm (stiff) material. Transparent, yellow.	-35 to 165°F (-37 to 74°C)	None	CO_2: 100 H_2: 97 O_2: 22 N_2: 12	Sterilization is not recommended.
PharMed® (65) 06485	Great for tissue and cell work—nontoxic and [illegible] life minimizes risk of fluid exposure; reduces tubing costs and pump downtime. Opaque to UV and visible light to protect light-sensitive fluids. Heat sealable, bondable, and formable. Extremely low gas permeability. See above for high-pressure version.***	Acids: Good [illegible] Organic solvents: No Pressure: Good*** Vacuum: Excellent Viscous fluids: Good Sterile fluids: Excellent	Potential leaching of USP mineral oil or blend material.	Thermoplastic elastomer. Polypropylene® based material with USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, beige.	-60 to 270°F (-59 to 135°C)	USP Class VI FDA 21 CFR 177.2600 NSF-listed (Standard 51)	CO_2: 1200 H_2: — O_2: 200 N_2: 80	Sterilize with ethylene oxide (ETO), autoclave or gamma irradiation up to 2.5 Mrad. Repeated autoclaving will not affect overall life.
Norprene® (A 60 G) 06404	Best choice for vacuum/pressure applications. Offers longest life with good flow consistency. Heat and ambient ozone resistant. Good resistance to acids/alkalies. Black color hides dirt and dust. Heat sealable, nonaging, and nonoxidizing. High dielectric constant.	Acids: Good Alkalies: Good Organic solvents: No Pressure: Excellent Vacuum: Excellent Viscous fluids: Excellent Sterile fluids: No	Potential leaching of USP mineral oil or blend material.	Thermoplastic elastomer. Polypropylene-based material w/ USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, black.	-60 to 270°F (-59 to 135°C)	None	CO_2: 1200 H_2: — O_2: 200 N_2: 80	Sterilize by autoclave only.
Norprene® Food 6402	Similar to Norprene (06404) but with FDA approval; excellent for food/dairy applications. Longest life, good flow consistency. Heat and ozone resistant. Good resistance to acids/alkalies. Heat sealable, nonaging, and nonoxidizing. High dielectric constant.	Acids: Good Alkalies: Good Organic solvents: No Pressure: Excellent Vacuum: Excellent Viscous fluids: Excellent Sterile fluids: Good	Potential leaching of USP mineral oil or blend material.	Thermoplastic elastomer. Polypropylene-based material w/ USP mineral oil. Excellent tensile strength. Firm (stiff) material. Opaque, beige.	-60 to 270°F (-59 to 135°C)	FDA 21 CFR 177.2600 NSF-listed (Standard 51)	CO_2: 1200 H_2: — O_2: 200 N_2: 80	Sterilize by autoclave. Repeated autoclaving will not affect overall life.
Viton® 06412	Our most chemical resistant tubing. Resistant to corrosives, solvents, and oils at elevated temperatures. Low gas permeability.	Acids: Excellent Alkalies: Excellent Organic solvents: Variable Pressure: Good Vacuum: Good Viscous fluids: Good Sterile fluids: Fair	Limited pumping life.	Thermal set rubber. Viton B (67% fluorine). Firm (stiff) material. Opaque, black.	-25 to 400°F (-32 to 205°C)	None	CO_2: 76 to 79 H_2: — O_2: 13 to 15 N_2: 4.3	Sterilization is not recommended.
PTFE 77390-series	Excellent chemical resistance. Maintains high fluid purity—will not absorb or leach into solutions. High-pressure capability up to 100 psi. Clear for easy flow monitoring. Very low gas permeability. Smooth bore.	Acids: Excellent Alkalies: Excellent Organic solvents: Excellent Pressure: Excellent Vacuum: Good Viscous fluids: Excellent Sterile fluids: Excellent	Limited pumping life. Not recommended for pumping gases.	PTFE fluoropolymer. Rigid material. Translucent, clear.	-400 to 500°F (-240 to 260°C)	USP Class VI.	CO_2: 6.8 H_2: — O_2: — N_2: 1.0	Sterilization with ethylene oxide (ETO), autoclave, or dry heat

* $\frac{cc \times mm}{(cm^2 \times sec. \times cm\ Hg)} \times 10^{-10}$

Bioprocessing: Gases, Flashback Arrestor, Airgas supplier

From Airgas STL: PN Y33-1FA44
Manf: SuperFlash
Model: DGN, Fuel, ¼” NPT

Flashback Arrestor for Regulators and Point of Supply. Model DGN flashback arrestors can easily be installed on the outlet fitting of most regulators and gas supply points. They help meet ANSI Z49.1:2005, OSHA, and NFPA safety requirements and help protect against the most common causes of accidents such as reverse gas flow, flashback, and hose burn backs. Each DGN is 100% tested with actual flashbacks and have built in 100 micron inlet filters, reverse flow check valves, flame barriers, and thermal cut-off. Inlet: G-3/8" Female LH x Outlet: G-3/8" Male LH, Fuel Gas Service Model: DGN

Bioprocessing: Notes from Fall2010 Class Instructors

245000xxx Series
SWABABLE VALVES

245600xxx Series
SWABABLE Y-VALVES

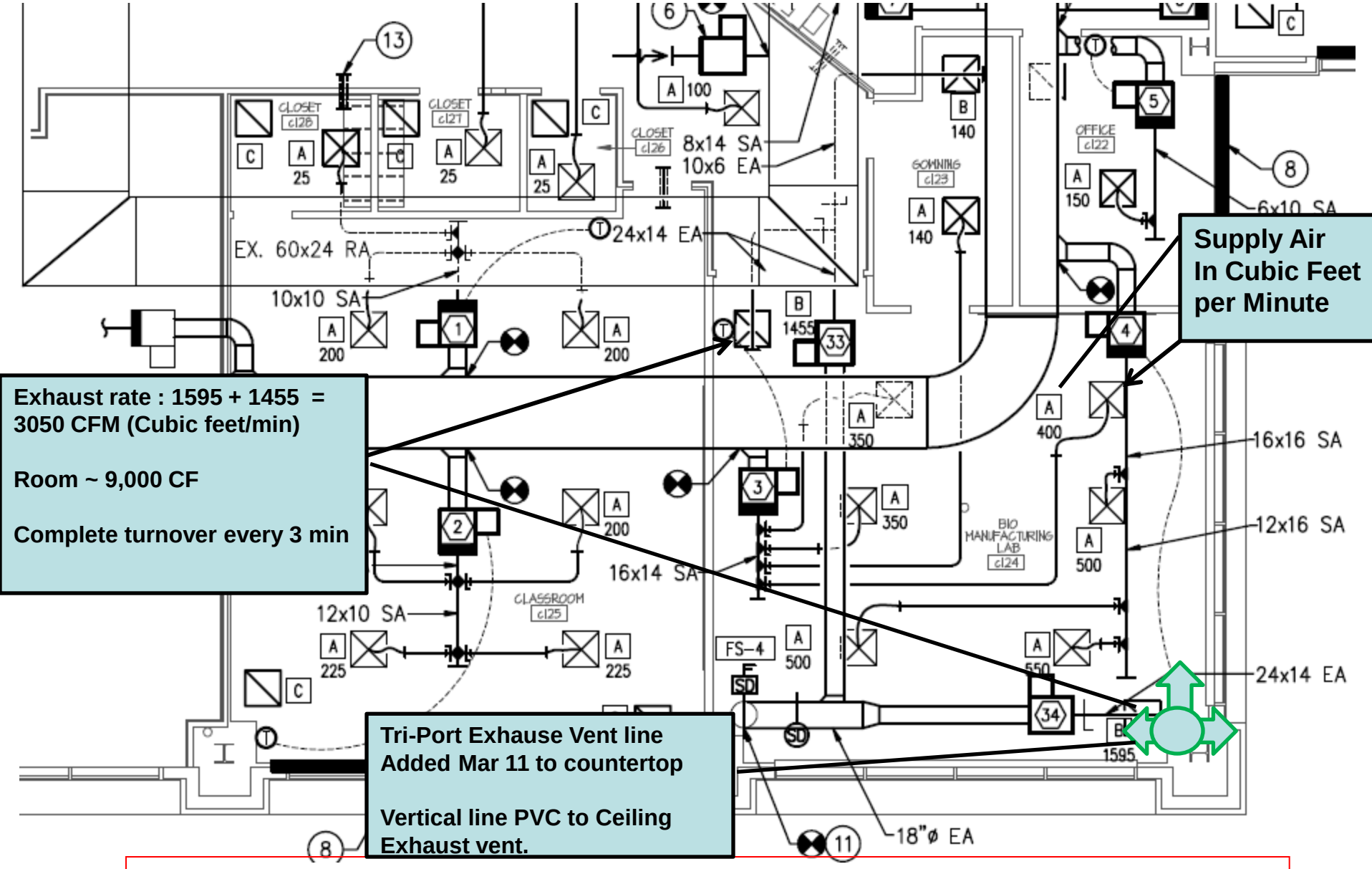
These new swabable luer valves were developed as substitutes for needle ports in IV applications. They are designed to fill, hold and release controlled amounts of fluids on demand. Needless access sites are designed for drug delivery/I.V. therapy applications as replacements for needle access ports. The valve stem and body will mate securely with all standard luer syringes and luer connectors. All materials are Gamma resistant, USP Class VI, latex free and DEHP free. Bodies are available in polycarbonate or in PVC for easy bonding. The stems are produced from silicone. The valves are compatible with American National Standards for medical material, luer taper fitting ISO 594, ANSI/HIMA MD 70.1-83, EN20594 and BS 5081, 176. The series 245000xxx is a swabable valve utilizing a female luer lock connector and a male luer lock adapter. The series 245600xxx is a swabable valve utilizing a female luer lock connector and an inline "Y" adapter.
Halkey-Roberts Corporation, An Atrion Company, 11600 9th St. N., St. Petersburg, FL 33716. Tel: 727-577-1300; Fax: 727-578-0450.

Bob, 12/10/2010
Here is the bioprocessing ideas that Dennis Cooley threw out at me last Wednesday. I'm just passing on his ideas…valid or not….for future use.
*It looks like the filter off the condenser was somehow getting clogged, and was not passing air afterward. His suggestion was to run tubing from the condenser to a catch vessel, and then use a filter on the catch vessel.
* He thought that maybe the condenser didn't work very efficiently at higher temperatures, so maybe that is why the cooler was ran at lower temperatures. (Which brought on more "sweating"…)
*For any future mammalian cell culture runs, he suggested using the sparge RING instead of the STONE to inject the air/CO2 (I don't remember which) into the vessel.

B.

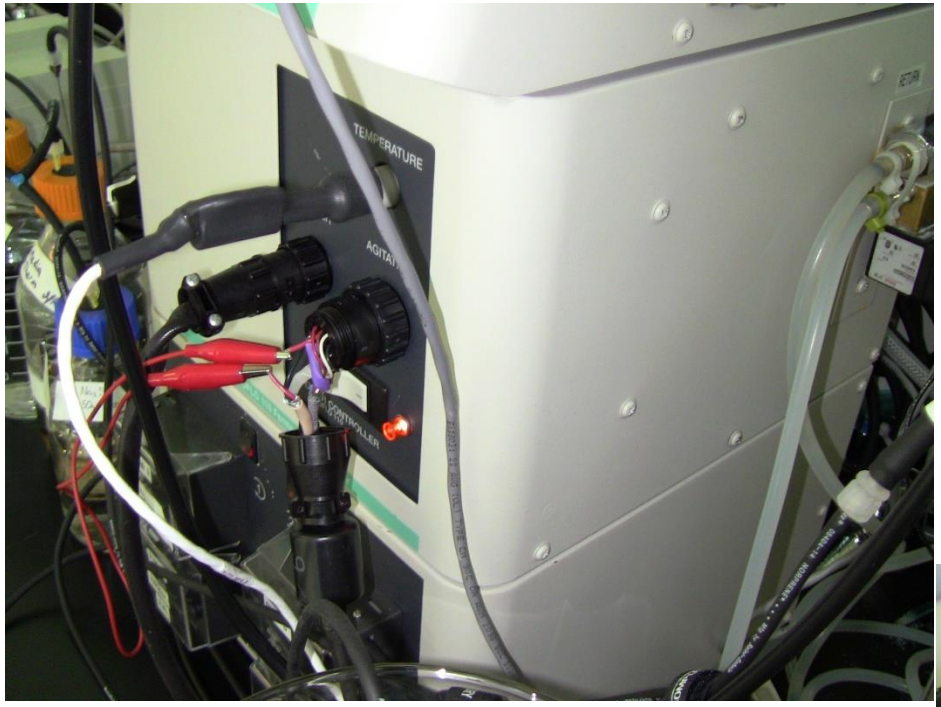
There is a company of the manual used forthe class in another email. Now stored in Protocols Directory on Pdrive. By BobM 12/12/10

Lab Systems: BRDG HVAC; R122, Bioprocessing, Classroom, NE Seg



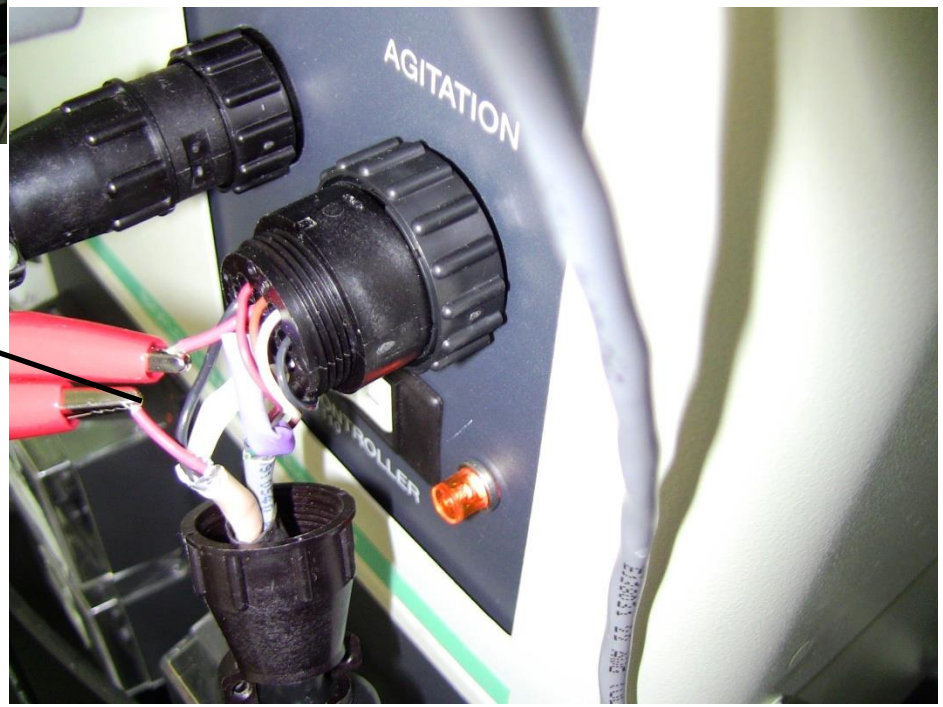
Hotlink to Wexford BRDG Park Drawing, New Work, 1st floor, M11-201

Bioprocess: Motor Power Consumption, Access for Amp Meter



Mike Davies project July 2011
Access to power consumption of motor/agitator
Located positive current line in control cable
(per manual diagram) cut for access to Amp meter

Positive Current line



Bioprocessing : Chiller, ThermoFlex 900, Neslab/Thermo

Specifications
Reservoir Volume 1.9 gal. (7.2L)
Temperature Range 5° to 40°C (Ambient +10° to 40°C)
Temperature Stability ±0.1°C Display LCD
Order Bags from Fisher Scientific per info below: 101101010000006 900w; Pumping option PD1; 115V

1	1	EA	NC9586068	FLUID BAG FILTER	22.83	22.83

Vendor Catalog # 093777
Original Catalog Number 093777

1. On/Off toggle at top rear
2. Push On/Off
3. Set Temperature

Hotlink to NesLab/Thermo Chiller User Manual…pdf

Bioprocessing: Chiller, Set Temperature Programming

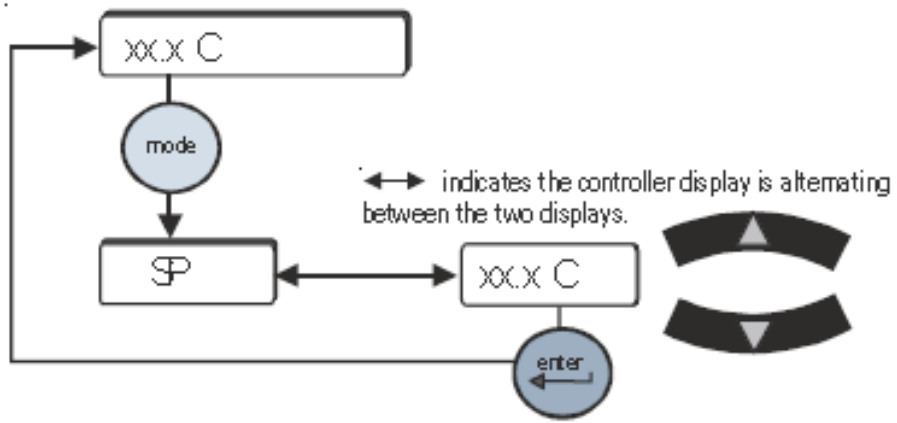
Setpoint Loop (SP)

- Ensure the controller is either a blank screen (not yet initialized) or displaying the process fluid temperature.
- Press the mode key and the controller display will alternate between **SP** and the setpoint value.
- If no change is required press the enter key to return the display to the process fluid temperature.
- If a setpoint change is required, use the ▲▼ keys.

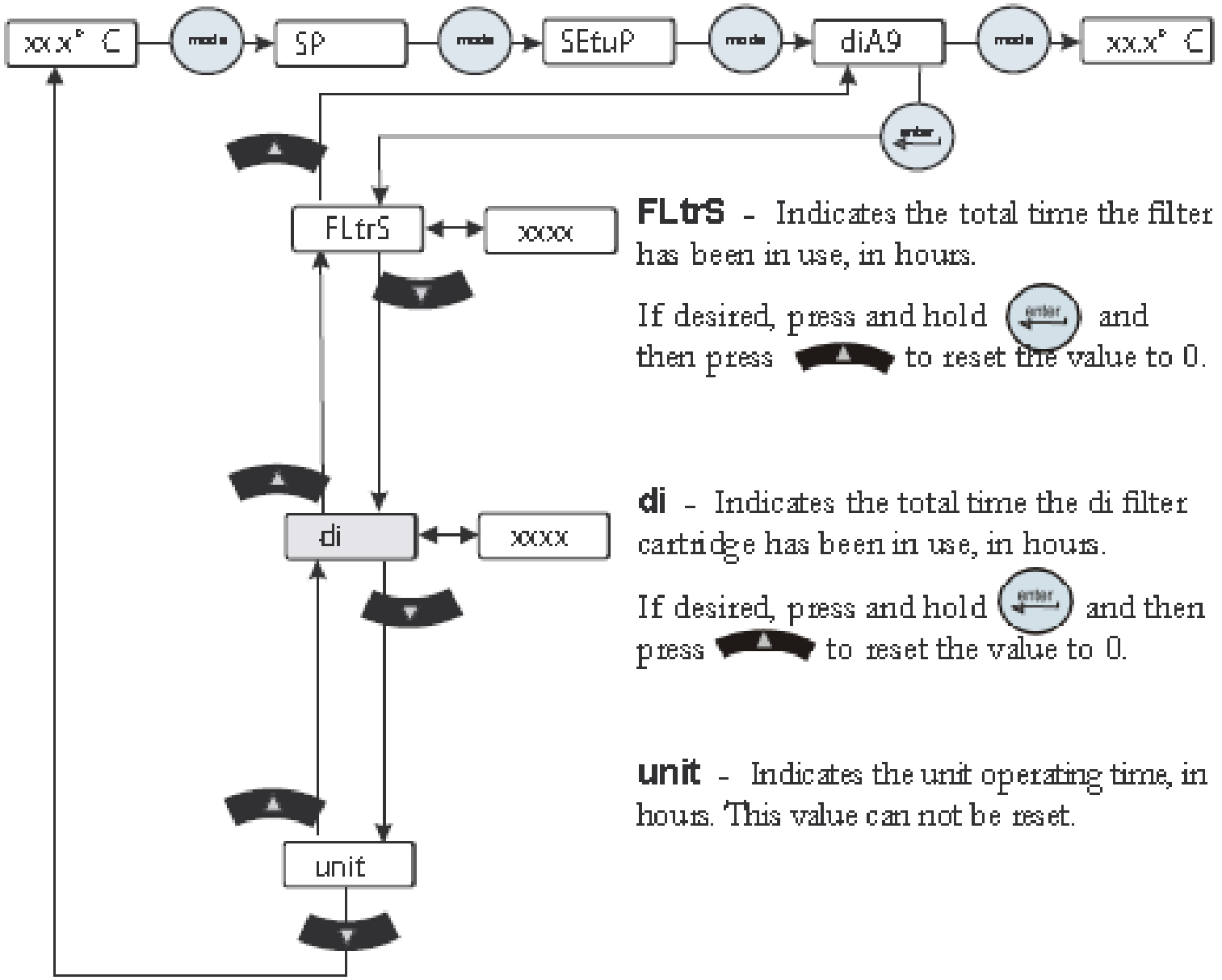
  The setpoint range is +5°C to +40°C.

NOTE If the ▲▼ are not used within one minute the controller will time out and return to the process fluid temperature display and any changes will not be accepted. ▲

- Once the desired value is displayed press the enter key to confirm the change.
- The display will return to the process fluid temperature.



Bioprocessing: Chiller, Reset Filters



FLtrS - Indicates the total time the filter has been in use, in hours.

If desired, press and hold enter and then press ▲ to reset the value to 0.

di - Indicates the total time the di filter cartridge has been in use, in hours.

If desired, press and hold enter and then press ▲ to reset the value to 0.

unit - Indicates the unit operating time, in hours. This value can not be reset.

Figure 6-6 Filter Timer Reset

Bioprocessing: Crossflow System, Satorius-Stedim Slice 200

(17525SYS-BT1)

Automate, optimize and document the crossflow processes. The powerful controller of this unit provides your crossflow process with a constant feed rate or constant, predefined inlet pressure by adjsuting the speed of the peristaltic pump head. Constant Transmembranepressure is also possible. Up to five different independent alarms allow the user to stop the crossflow process automatically or to give an alarm e.g. after a predefined permeate weight signal is triggered or a maximum pressure limit is reached. All values are transferred to a Worksheet of the Sartowedge data collection software. Some visual graphs are predefined for fast process control.

- User defineable alarms for reliable operations
- On board application programs
- Finger-tip control via the front panel
- Interfaces directly to PC
- Optically-encoded and servo-controlled pump motor
- Real-time process verification and documentation

FEATURES:

- Tandem 1082 Peristaltic Pump
- 500 ml Graduated PES (Polyethersulfone) Feed Vessel
- 316L (1.4404|1.4435) SS Sartocon Slice 200 Holder
- Sartorius Laboratory Balance Talent TE 4100
- Medical Grade Pressure Transmitters
- 900 RPM Integral Stir Plate and stir bar
- Luer Fittings, T-pieces, Valves and Vents
- Pinch Valve for back pressure control
- 6 feet of Phar Med #15 Tubing
- Balance and Pump RS232 Interface cables
- Win Wedge|SartoWedge PC Software

Hot Link to Satorius Slice Brochure (parts list) ..pdf

Printed manual available in Bioprocessing room
No online digital manual has been located.

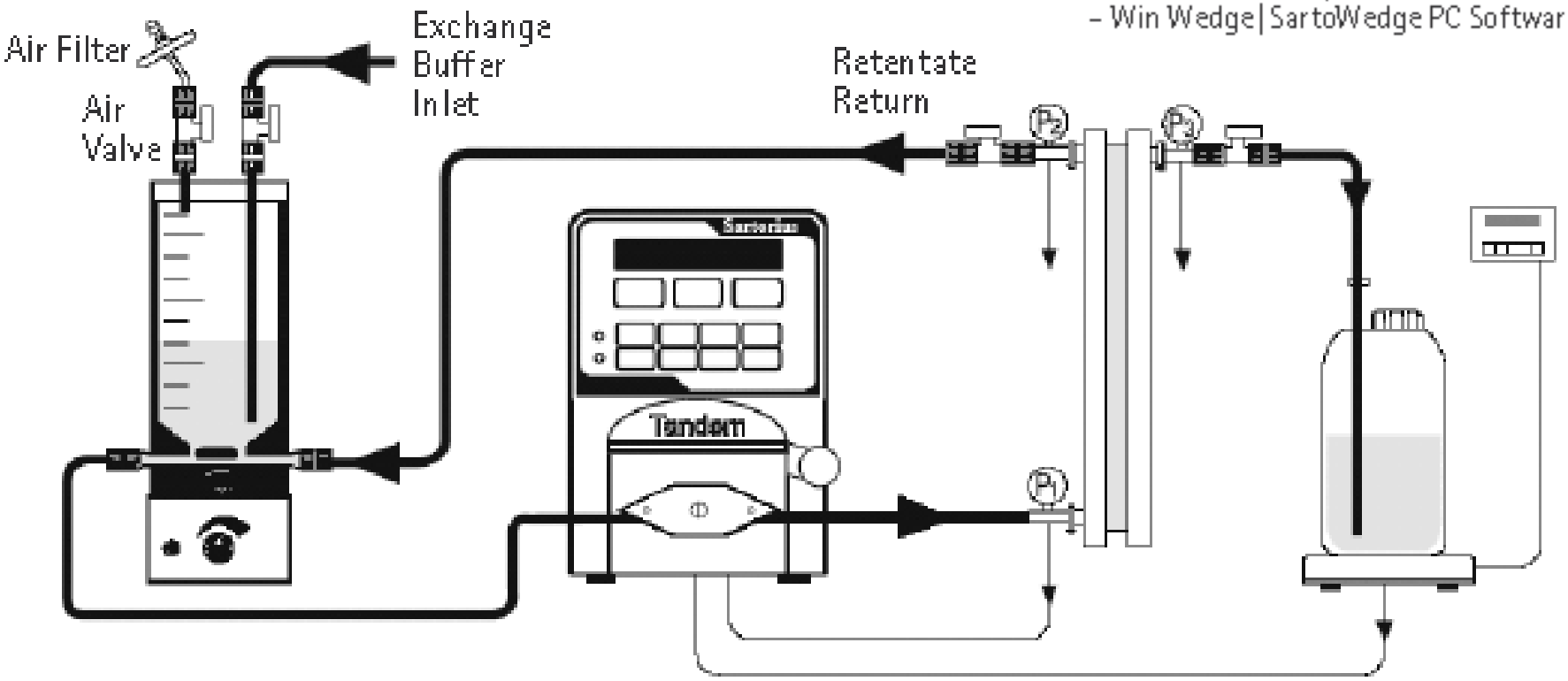
Bioprocessing: Crossflow-Slice, Diagram

Technical Specifications

Pump Output	50–2,200 ml/min @ 40 psi | 2,5 bar
Filter Area	200 to 400 cm^2
Tank Volume	500 ml
Min. Operating Volume	<20 ml
Max. System Pressure	58 psi | 4 bar
Connections	Luer
Dimensions (W x D)	60 cm x40 cm
RS232 Communications	

Major Components

- Tandem 1082 Peristaltic Pump
- 500 ml Graduated Polysulfone Feed Vessel
- 316L (1.4404 | 1.4435) SS Sartocon Slice 200 Holder
- Sartorius Laboratory Balance Talent TE 4100
- Medical Grade Pressure Transmitters
- 900 RPM Integral Stir Plate and stir bar
- Luer Fittings, T-pieces, Valves and Vents
- Pinch Valve for back pressure control
- 6 feet of Phar Med #15 Tubing
- Balance and Pump RS232 Interface cables
- Win Wedge | SartoWedge PC Software

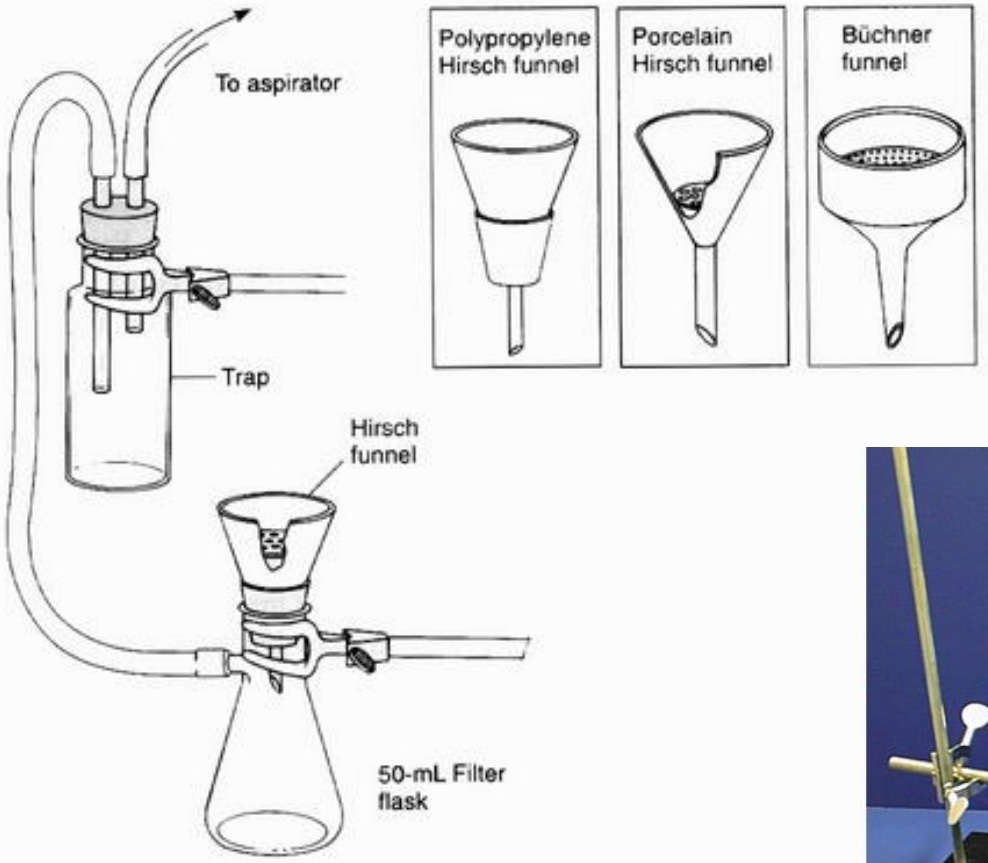


Bioprocessing: Filtration, Karl Fischer

Donated by Denise Heinz [mailto:denise.heinz@apertuspharma.com]

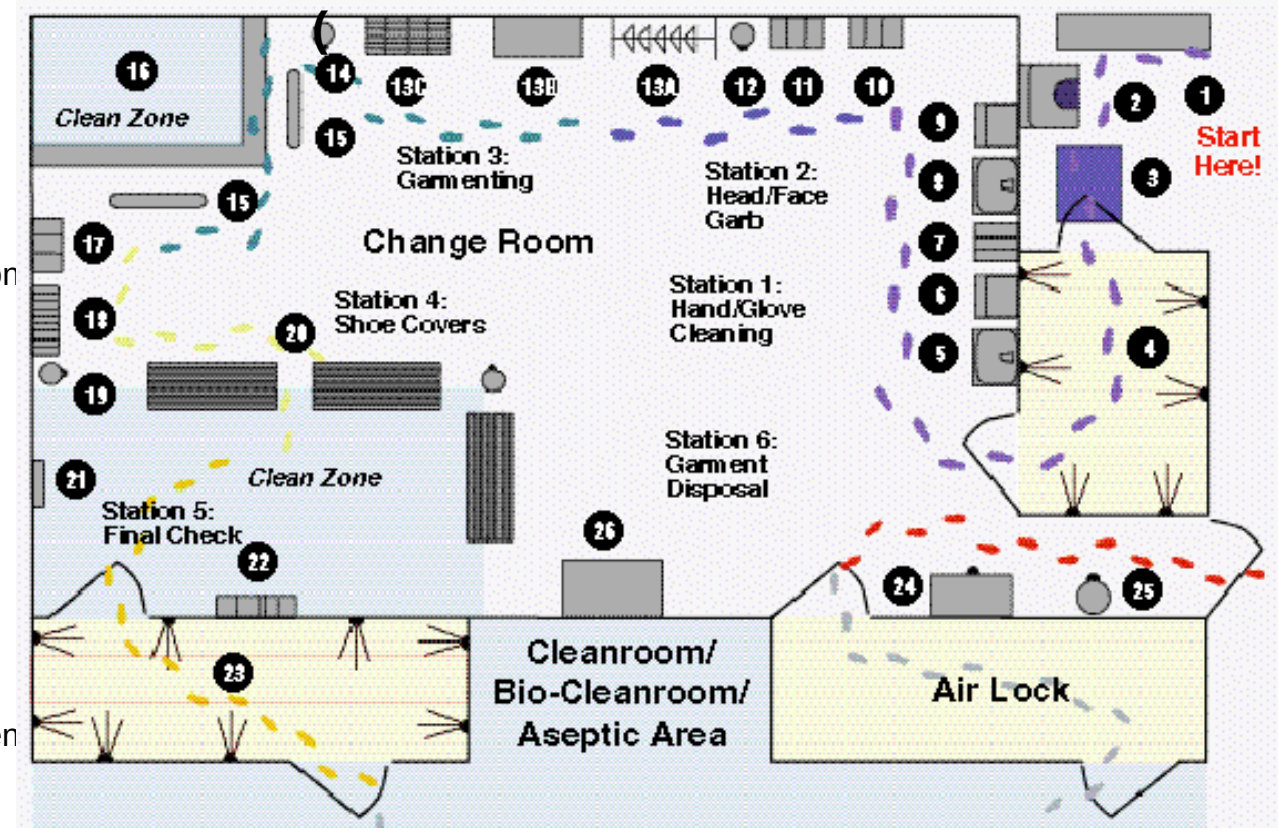
titration method in analytical chemistry that uses coulometric or volumetric titration to determine trace amounts of water in a sample.

Bioprocessing: Filtration, Vacuum, Examples



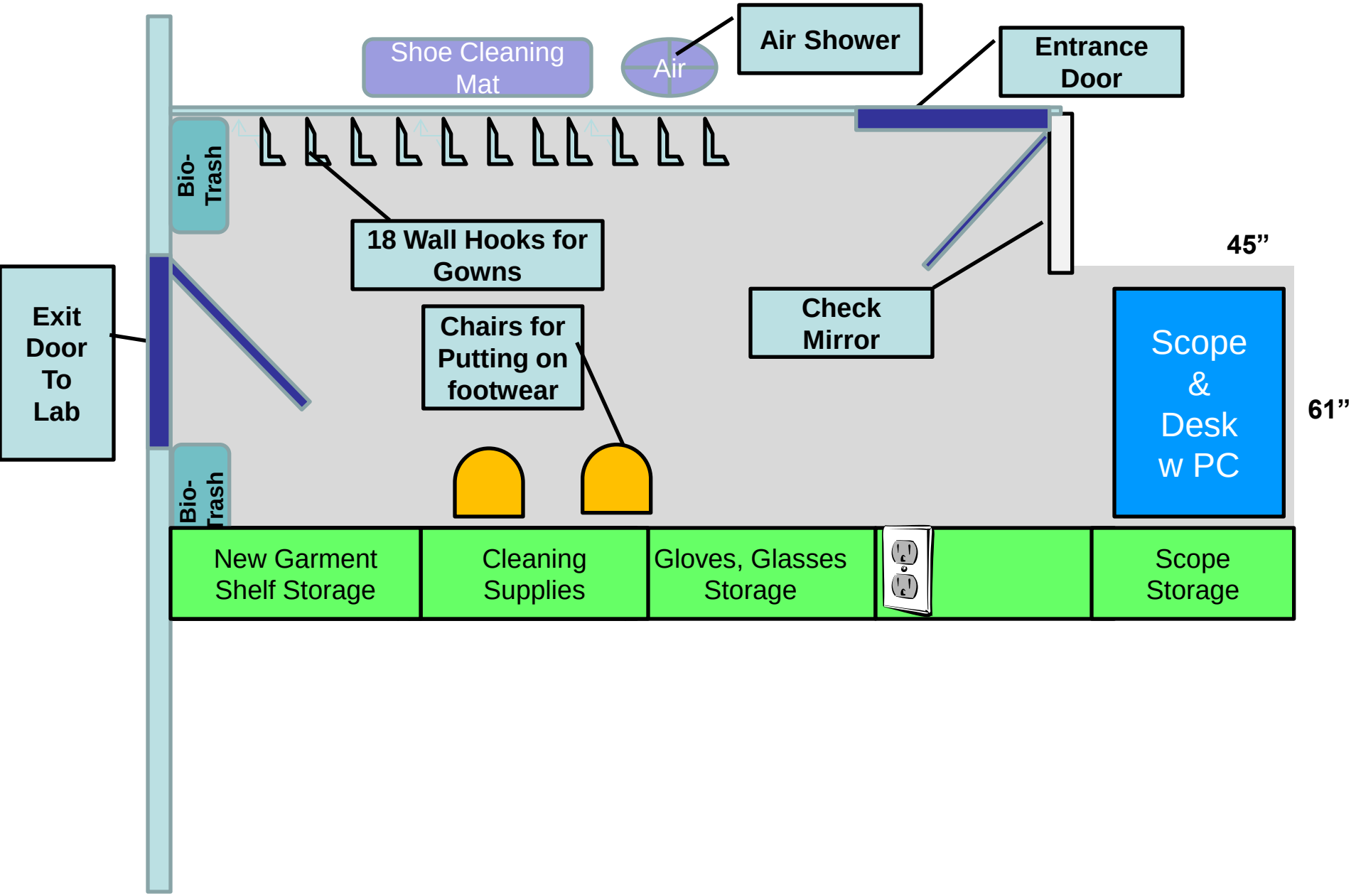
Biosafety: Clean/Bio-Safe Gowning Room Design Features

EXAMPLE

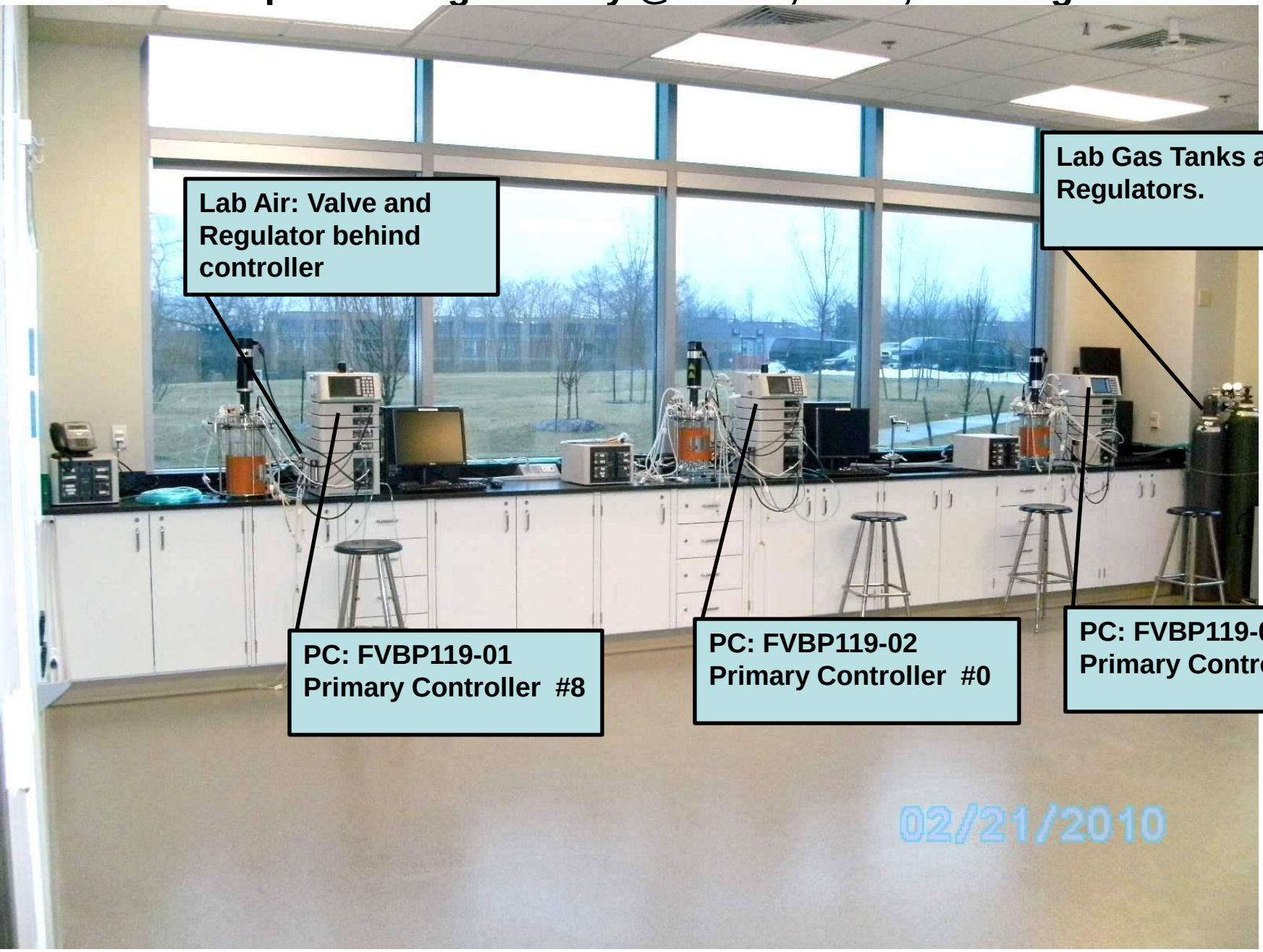


1. Secure lockers for personal property
2. Shoe cleaner, w brushes
3. Walk-off adhesive shoe mat
4. Air Shower, HEPA loose contaminants
5. Hand washing station, no-touch operation
6. Hand dryer HEPA filtered air, no touch
7. Dispenser for glove liner or underglove
8/9. Glove washing/drying station
10. Headwear dispenser
11. Face mask dispenser
12. Waste receptacle
13. Garment Storage Facility
13a Open Rack for reusable garments
13b Enclosed Cabinet for reusable garmen
13c Shelves for disposable garments
14. Waste Receptacle
15. Ergonomic Lean Rails support personnel while donning coveralls
16. Gowning Platform provides a noncontaminated surface to prevent violation of garment
17. Wiper dispenser—used to clean bench prior to putting on booties
18. Bootie/shoe cover dispenser (may also be incorporated into benches)
19. Waste Receptacle
20. Gowning benches, used when putting on booties. Booties stay on "clean" side
21. Cleanroom mirror for final self-inspection (side-by-side w/poster showing correctly garbed model)
22. Safety glass and overglove dispensers
23. Air shower—may be required in cleanroom entrance
24. Garment hamper for reusable garments to be laundered
25. Waste receptacle for disposable garments
26. Tools, supplies cabinet for overstock garments or cleanroom supplies

BioSafety: Gowning Room 120, Proposed Layout



Bioprocessing: Facility @BRDG, R119, Looking North


Lab Air: Valve and Regulator behind controller
Lab Gas Tanks and Regulators.
PC: FVBP119-01 Primary Controller #8
PC: FVBP119-02 Primary Controller #0
PC: FVBP119-03 Primary Controller #12
02/21/2010

Bioprocessing: Facility @BRDG,Looking NW

Bioprocessing: Facility @BRDG, Looking SE

Bioprocessing: Info; CITSen, Glucose Sensor-Receiver

$58

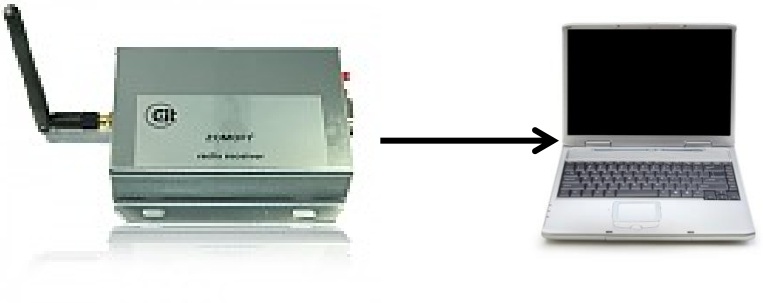
CITSens Bio sensor is a screen-printed electrode with an immobilized enzyme and is connected with a cable to the **CITSens Bio** beamer. The measured data will be transmitted wireless to the receiver **ZOMOFI®** which is connected via **RS232** or LAN to a PC.

Suitable for all standard disposable reactors such as spinner flasks, roller bottles, T-flasks, hyper flasks, Erlenmeyer flasks, cell stacks, customer-specific systems, bag reactors and other SUBs (single-use-bioreactors). The sensor is fit in the corresponding original cap, subsequently gamma-sterilized and delivered to the customer ready for use.

$158

The **CITSens Bio beamer** is a radio transmitter, which transmits the measured data from the **CITSens Bio sensor** glucose, lactate or glutamate to the **ZOMOFI®**.

$6890



CITSens Bio ZOMOFI® receives data from **CITSens Bio beamer** which have been collected online by either **CITSens Bio** sensor glucose, -lactate and/or -glutamate. **ZOMOFI®** can receive measurement data from up to 1000 beamers and transfers them to the PC by means of **RS232** or LAN. The **CITSens Bio** software imports the data and stores them in a database.The measured values can be processed, displayed and saved by the means of the **CITSens Bio software** in [g/l] und [nA].

Bioprocessing: Info;YSI Glucose Monitoring/control

On-Line Analysis

For processes that require frequent monitoring and regulation, on-line analysis allows you the freedom to sample automatically and adjust both nutrient and byproduct concentrations.

Couple the YSI 2730 Aseptic Monitoring & Control system with the 2700 SELECT and pull samples directly from a bioreactor, measure important nutrients and byproducts, and immediately control the replenishment of nutrients, if needed, while maintaining the sterility of the process. All system components are sterilizable.

How On-Line Monitoring Works

The YSI 2730 Monitoring and Control system pulls sample directly from a bioreactor and pumps it to the YSI 2700 SELECT at programmed intervals. After each analysis, an antiseptic reagent, typically a dilute hypochlorite or hydroxide solution, is flushed through the sample lines and remains there until the next cycle to assure sterility.

For those bioprocesses in which loss of cells is a concern, you can connect the YSI system to an on-line filtration device. You can adjust system parameters, such as flow rate, to accommodate the needs of the filtration device.

For regulation, connect the YSI 2700 SELECT to a feed pump. When nutrient concentration falls below a programmed setpoint, the YSI 2700 SELECT will signal the feed pump to add nutrient to the bioreactor.

Other system variables, such as sampling interval and concentration setpoint, allow you to customize the instrument for your process needs. For example, with processes that consume glucose quickly, you can configure the system to monitor glucose every few minutes. For other processes that consume nutrients slowly, monitoring every 30 or 60 minutes may be more appropriate.

Bioprocessing: Info; Online Glucose with Finesse

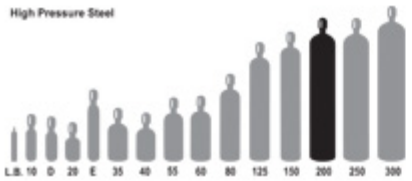
On-line glucose measuring with Finesse - Windows Internet Explorer
http://www.in-pharmatechnologist.com/Processing-QC/On-line-glucose-measuring-with-Finesse
Google
File Edit View Favorites Tools Help
Favorites
St. Louis Community College...
Center for Plant and Life Sci...
STLCC - Computer Support ...
STLCC FV SMET Division Ho...
Dell Education Purchase Pro...
YSI Life Sciences - 2700M
Sensor Solutions | Fines...
On-line glucose mea...
Home
Feeds (J)
Read Mail
Print
Page
Safety
Globalisation
Lifecycle management
Counterfeiting
Mergers and acquisitions
On-line glucose measuring with Finesse
By Dr Matt Wilkinson, 05-Apr-2007
Related topics: Processing & QC
The first step towards true in-line glucose monitoring for cell culture bioprocesses has been made that will allow greater control over the bioprocess manufacturing.
In collaboration with Nova Biomedical, Finesse Solutions has combined Nova's Bioprofile 400 mammalian cell culture analyser with an online sampler and feedback controllers.
The company claims this will deliver automated on-line, round-the-clock glucose monitoring and feed control for cell culture bioprocesses to a level of control not previously attainable.
Glucose monitoring and control in bioprocess manufacturing is needed to ensure the optimum conditions for growing cell cultures that produce complex therapeutic proteins such as monoclonal antibodies.
Biomanufacturers have been forced to use manual methods of sample extraction and analysis to measure the glucose levels, according to Finesse. This data would then be manually fed into the bioprocess controller which would add more glucose as the cell cultures required.
Larry West, executive vice-president of sales and marketing at Finesse, believes that this practice has been both costly and highly ineffective in attaining true process control.
While in-line and in situ sensors for pH and dissolved oxygen are available, the implantation of an in situ glucose monitoring system has proved difficult.
Any glucose sensor would need to be able to withstand the harsh sterilisation techniques used to clean bioreactors that often employ aggressive chemical cleaning methodologies or heating the reactor to temperatures over 130ºC for over 30 minutes.
According to West, the latest offering is the closest thing to real-time in situ bioprocess glucose control achieved to date. The system will sample the culture every 3 minutes and can maintain a high level of process control.
West continued by saying that Finesse and Nova will be showcasing a new
Discover Capsugel's All-In-One Solution for Clinical Trials
WHEN YOU NEED TO BE SURE SGS
MOST POPULAR NEWS
1. EU could make API suppliers verify starting material sources
2. US hits Ranbaxy with injunction to boost manufacturing quality
3. Novartis hit with another 483 after FDA finds repeat failings
4. Pfizer recalls birth control pills after blister packaging error
5. AstraZeneca to cut 1,350 'operations support' jobs
AUDIO & VIDEO NEWS
People on the move: jobs in pharma
People on the move: jobs in pharma
Excipact scheme to launch next week
Start
note_gadget ...
Inbox - Mailb...
On-line gluc...
Bioprocessing...
On-line glucos...
8:46 AM

Bioprocessing: Gas, Oxygen,

OXUSP200 from Airgas

All Categories / Gases / Medical Gases / Oxygen - Medical

Oxygen, USP Grade, Size 200 Cylinder, CGA540



Enlarge Image

PART NUMBER:
OX USP200

UNIT PRICE:
Reg. Price: Call 855-440-8095 for price and availability.
Web Price: Call 855-440-8095 for price and availability.
Min Purchase Qty: 1 CL

EXTENDED PRICE: